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ABSTRACT

This guide presents suggestions for field trips, out-of-doors activities, material for centers, and individualized activities in the teaching of elementary school science and particularly environmental education at the elementary level. The guide includes a section on preparation and procedures for conducting field trips, including sample administrative forms and permission slips. A section on environmental activities presents class activities dealing with the environment. A third section presents activities to be undertaken out-of-doors. A three-part sample environmental education test is provided. (RE)

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Elementary
Environmental Activities

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Laramie County School District Number One
Cheyenne, Wyoming 82001

LARAMIE COUNTY SCHOOL DISTRICT NUMBER ONE

Elementary
Environmental Activities

May, 1975

Robert J. Larson, Eco-Lab Coordinator
and
Environmental Educator
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FOREWORD

Increased interest in environmental activities on the part of students, teachers, parents, and industry has challenged the staff of Laramie County School District Number One to meet the need for supplementary material. Fortunately, this District has an outstanding Ecology Laboratory developed through a special Title III grant. The grant provided help for the development of district curricula, inservice education, and the extension of the classroom.

During the last four years of development and implementation, many elementary teachers were involved in the development of activities to enhance the science program. The participants (teachers of pre-school through sixth grade) are responsible for the program material presented in this supplement to the district science program. Procedures for field trips, out-of-doors activities, material for centers, and individualized activities are to be found in this guide.

Appreciation is extended to Robert J. Larson, Environmental Education and Project Coordinator, and to all those teachers who contributed their time and talent to the production of "Elementary Environmental Activities." This is an appropriate publication to appear at the beginning of our Bicentennial Celebration. The challenge to cherish and care for the natural resources and sheer beauty of our land must be met early and reinforced throughout our lives.

Betty Lou Pagel
Supervisor of Curriculum Development

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GUIDE for FIELD TRIPS

LARAMIE COUNTY SCHOOL DISTRICT NUMBER ONE

Administration Building
Cheyenne, Wyoming

PHILOSOPHY

Science should be taught in a continuing balanced program, correlated with other curriculum areas, with the student and his development being considered at all times. The elementary science program should encourage the child to display logical and creative thinking, and become better prepared to solve problems which are personally, socially and ecologically oriented. Children should have ample opportunity to use manipulative materials. Our program should stress a framework of concepts and processes which need to be interrelated and started at the primary level and expanded in the intermediate grades.

OBJECTIVES

1. To guide the pupils:
    a. In exploring the material aspects of our universe, and in the wise use of the resources of the universe.
    b. In becoming familiar with their environment through controlled investigations.
    c. In the verification, interpretation and recording of data they observe.
    d. In making predictions on the basis of knowledge previously gained.
    e. In a program which recognizes individual differences and permits each child to acquire knowledge and skills

based on each pupil's own growth potential.

f. In the development of responsibility for:
    (1) use and care of equipment, material, supplies, etc.
    (2) preparation and completion of teacher-pupil planned activities
    (3) proper respect of individuals and all forms of life

2. The teacher should stress the following basic scientific processes:
    a. K-3
        1. Recognizing and using space/time relationship
        2. Recognizing and using numbers and number relations
        3. Observing
        4. Classifying
        5. Measuring
        6. Communicating
        7. Inferring
        8. Predicting
    b. 4-6
        1. Formulating hypotheses
        2. Making operational definitions
        3. Controlling and manipulating variables
        4. Experimenting
        5. Formulating models
        6. Interpreting data

REQUEST FOR MOVING - TRANSPORTATION

Please make in triplicate and send all copies to the Supervisor of Transportation. One copy will be returned showing the action taken.

Request for all moving or transportation must be made by the principal to the Supervisor of Transportation. Requests must be in to the Supervisor of Transportation seven (7) days prior to the time the transportation is needed.

Date ______________________

School ____________________ Driver ______________ Bus # ________

Instructor in Charge ____

Load at __________________________ Objective of trip __________

____

Please list day or days bus is needed.

Destination	Date Desired	Time Leaving	Time Returning	Number of Students	Hours or Miles

Allocation Code (leave blank - will be filled in by Supervisor of Transportation)

Travel -Inst.	2520.______	Miles	__________	Cost	__________
Field Trips	10300.______	Miles	__________	Cost	__________
Athletics	10400.______	Miles	__________	Cost	__________
Music	10400.______	Miles	__________	Cost	__________
Forensic	10400.______	Miles	__________	Cost	__________
Dist. Charter	98007.______	Miles	__________	Cost	__________
Other	____________	Miles	__________	Cost	__________

APPROVED __________________

DENIED ____________________

Instructor Requesting ______________

Principal ______________________

Supr. of Trans. __________________

Administrative Regulation Code 6153

EDUCATIONAL TRIPS

Any teacher contemplating a trip requiring the use of transportation is to confer with the principal before making any arrangements. After securing the principal's tentative approval, the teacher is to get the permission of an official of the institution to be visited. The teacher then is to make out a transportation request and secure the principal's signature.

The principal shall schedule the educational trip and make transportation arrangements pursuant to Administrative Regulation 3541.32.

Approved June 28, 1971

Board Policy Code 6153

EDUCATIONAL TRIPS

Educational trips may be arranged for instructional purposes, providing such activities can be reasonably expected to enhance student learning experiences and are not unduly disruptive to the total school program.

Adopted June 28, 1971

It is suggested that the teacher make a ditto master including the following data, for each trip as it will save time otherwise spent filling out blanks on each student's form.

EDUCATION TRIP PERMISSION

XYZ Elementary School

Date ____________________

Dear (parent's name):

May (student's name) have permission to go on an educational trip to (place) on (date). The class will travel by (method of transportation). We will leave school at (time) and return to school at (time). We will appreciate having you sign the bottom portion of this letter and return it to school by (date). This indicates that you have granted permission for your child to go on the trip.

Yours truly,

____
(Teacher's name)

- -

Date ____________________

I hereby give my permission for (child's name) to go on an educational trip to (destination) on (date).

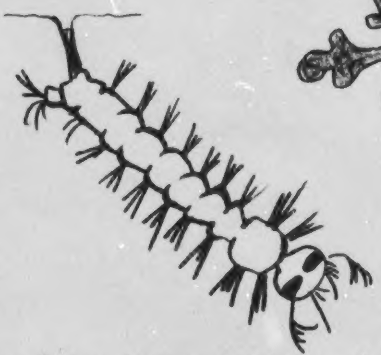
____
(Parent or guardian's name)

FIELD TRIP PROCEDURE

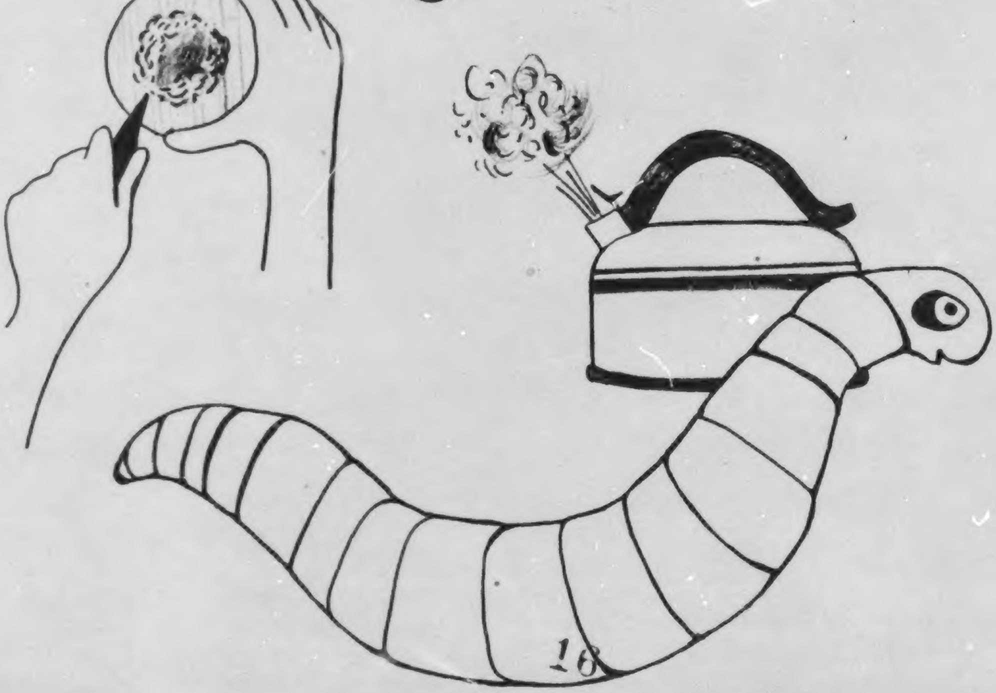
I. Before the trip
    A. Teacher responsibilities
        1. Investigate the site
        2. Arrange with officials in charge
        3. Consider students' ages and interests
        4. Use school stationery when written confirmation is needed
    B. Objectives
        1. To create an understanding of the relationships between man and his environment
        2. To encourage individual achievement
        3. To be able to make observations and draw conclusions
        4. To add variety to learning experiences
        5. To encourage educators and students to use community and natural resources
    C. Purposes
        1. To collect data
        2. To observe phenomena
        3. To gather specimens
        4. To identify relationships
    D. Trip preparation
        1. Required forms
            a. Parent permission
            b. Transportation request
        2. School board policies
        3. Transportation
            a. Mode
            b. Distance
            c. Cost
            d. Route to be taken
        4. Notification of special personnel
            a. Cafeteria
            b. Office
            c. Custodian
            d. Reading specialists, speech therapists, art teachers, music teachers, P.E. teachers, etc.
        5. Adult assistance
            a. Parents
            b. Teacher aides
        6. Class discussion
            a. Review equipment needed
            b. Discuss appropriate clothing
            c. Determine cost
            d. Discuss food if required on trip
            e. Determine general objectives
            f. Develop committees and assignments
                (1) Recorder
                (2) Photographer
                (3) Interviewers
                (4) Others (class feels are needed)

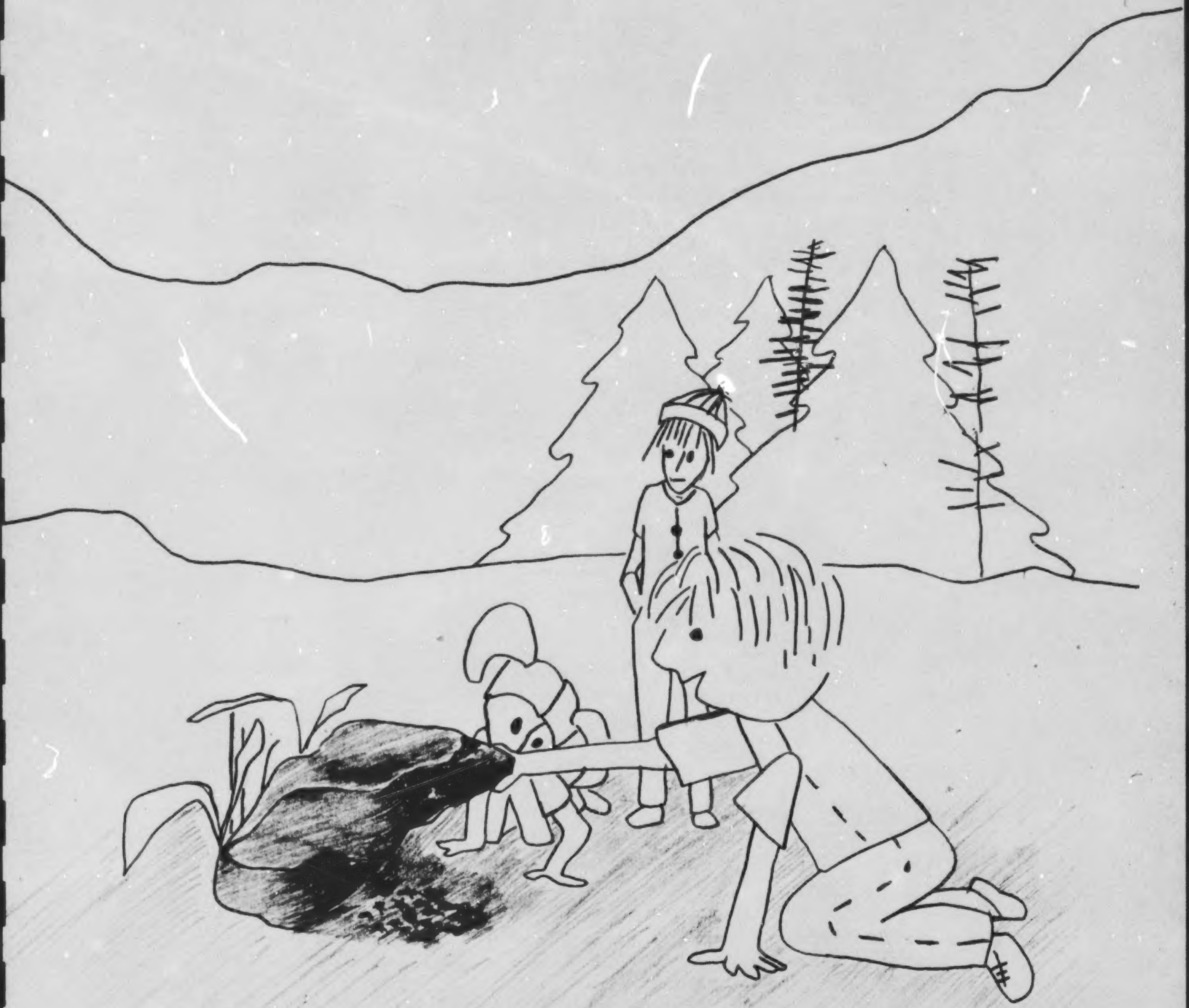
        - g. Develop safety procedures
        - h. Determine emergency measures
        - i. Prepare them for the unexpected

- II. During the trip
  - A. Use all senses
  - B. Keep stops short
  - C. Beware of surprises
  - D. Look for the most beautiful and most ugly places
  - E. Points of interest
- III. After trip
  - A. Thank you notes
  - B. Follow up activities
    - 1. Language experience stories
    - 2. Picture stories
    - 3. Story chart card
    - 4. Murals
    - 5. Food related projects
    - 6. Reproduce sounds and colors
    - 7. Models of field trip
    - 8. Dramatize
    - 9. Compose a song
    - 10. Related books - library
    - 11. Projects dealing with math
      - a. Example - distance and cost of trip
      - b. Estimate distance walked
    - 12. Creative writing
    - 13. Map of where they went
    - 14. Bulletin Board
    - 15. Grapevine - newsletter
    - 16. Make up test - (student-made of observation)
    - 17. Display items collected
    - 18. Cartoons
    - 19. Student awareness of occupations
  - C. Evaluation
    - 1. What could we do to better the trip?
    - 2. What was the most fun?
    - 3. What did you least enjoy?
    - 4. How did you feel about the trip?
    - 5. What could you tell your parents about trip?
    - 6. Would you like your parents (family) to go on the trip?
    - 7. What did you learn? What do you know now that you didn't before?
    - 8. Would you like to live there?
    - 9. What should we do now? What ideas did you get from the trip?
    - 10. What ideas did you get from the activities on this trip?



ENVIRONMENTAL ACTIVITIES





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Pre-school Submitted by Linda Crandall

COMPARISON OF INSECTS AT THE ECO-LAB

Behavioral Objectives:

1. The student will be able to identify insects found at the Eco-Lab.
2. The student will be able to give examples of insects found at the pond, by the trees and flowers, and out in the pasture.
3. The student will show what protective bodies the insects have in regard to their environment.
4. The student will be able to point out how the insects help the Eco-Lab.
5. The student will be able to categorize insects according to area found.
6. The student will be able to summarize findings accumulated during the trips to the Eco-Lab.
7. The student will do additional projects concerning this unit, such as make a model of the Lab and what insects live where.
8. The student will collect insects from these areas, by the pond, by the trees and flowers, out in the pasture at the Eco-Lab.

Directions to the teacher:

The unit is geared to examination of the Eco-Lab to find what insects live there. This unit is only a start to the world of insects and how they help us. Let the students organize and plan what they want to do with guidance from the teacher.

Directions to the students:

Make an insect cage; (instructions at end of unit) gather bottles; organize a field trip to the Eco-Lab.

Divide class into three groups. One group goes to the pond, one to the trees and flowers, the last to the pasture. Each group will find insects, catch them, and place in bottles.

Go back to classroom and identify the insects. Label the cages: 1. Pond, 2. Trees and Flowers, 3. Pasture. Make a chart showing examples of insects found in the areas.

Discuss what the insects must have as protection to live where they do. Discuss what function the insects play in their environment. Discuss what stage of development the insects were when found.

Make a chart showing life cycle of insects. Make a bulletin board like the one at the end of the chapter. Have an insect corner showing all the charts and cages. Watch and care for the insects, observing growth.

Materials:

Pint glass jar, screen, pie pans, oatmeal box, paper fasteners, bottles, references, chart paper, and a bulletin board.

Making an Insect Cage:

Use a pint glass jar and replace the center of the lid with a piece of screen wire to fit.

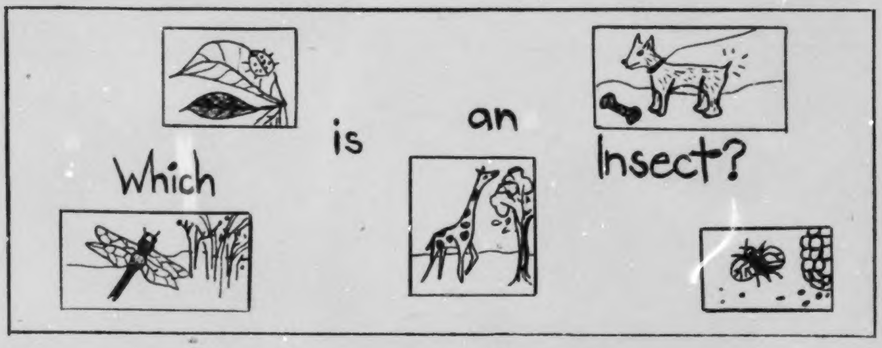
OR

Tie the edges of a piece of very fine wire screen to make a circular cage. Place the screen in a pie pan and use another pie pan for the lid.

OR

Use an oatmeal box and place fine wire screen inside the box. The screen can be tied together or fastened to the box with paper fasteners. Cut two or three holes in the box for viewing the insects.

Bulletin Board



References:

Robert B. Sund, Bill W. Tillery, Leslie W. Trowbridge, Elementary Science Discovery Lessons. The Biological Sciences. Allyn and Bacon, Boston, 1970, p. 28-31.

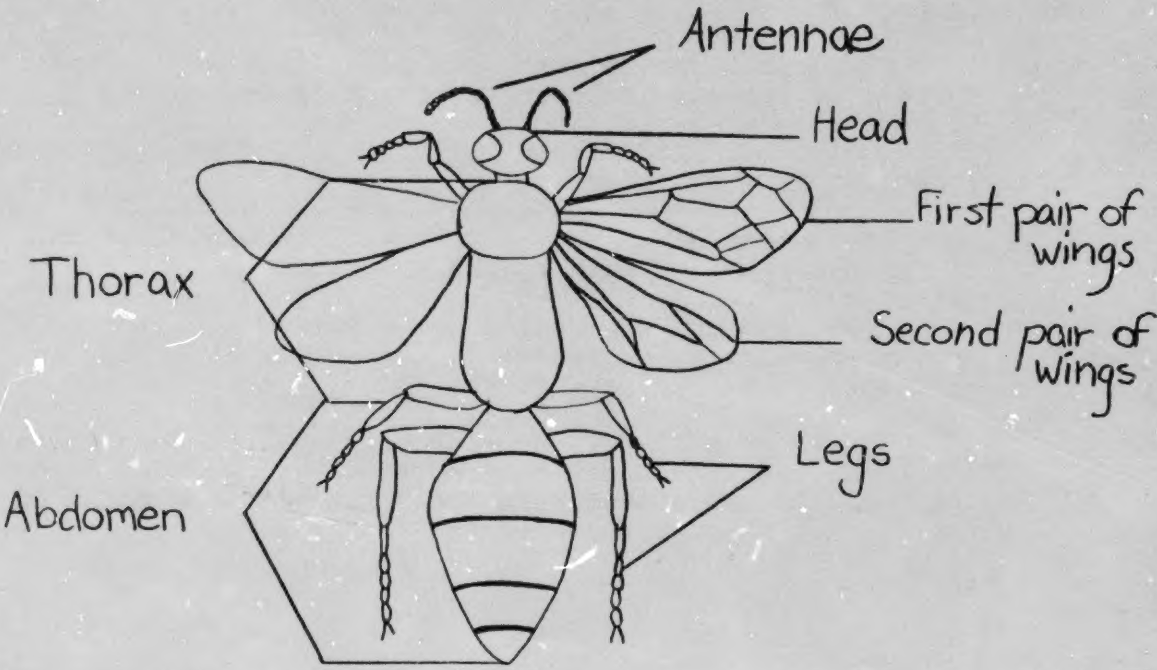
Alice Gray, Question and Answer Adventures, Insects. Golden Press, New York, 1965.

Jane Sherman, The Real Book About Bugs, Insects and Such, Garden City Books, New York, 1952.

Edwin Way Teale, The Junior Book of Insects, E. P. Dutton and Co., New York, 1953.

Su Zan Noguchi Swain, Insects in Their World, Garden City Books, New York, 1955.

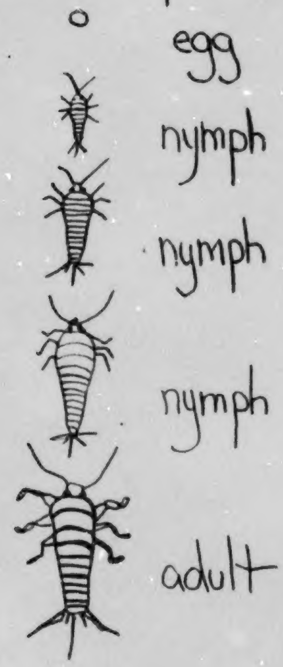
Parts of an Insect


Antennae
Head
First pair of wings
Thorax
Second pair of wings
Legs
Abdomen

STAGES OF DEVELOPMENT

Direct

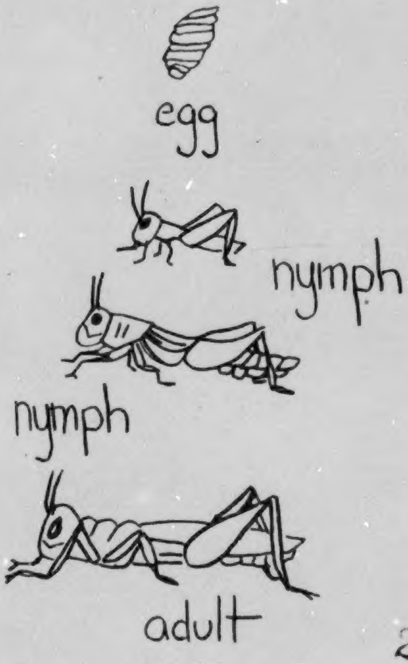
no metamorphosis


egg
nymph
nymph
nymph
adult

SILVERFISH

Gradual

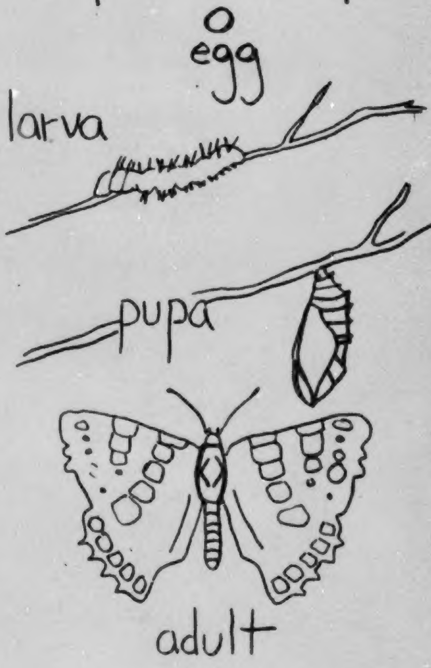
incomplete metamorphosis


egg
nymph
nymph
adult

GRASSHOPPER

Complex

complete metamorphosis


egg
larva
pupa
adult

BUTTERFLY

Pre-school Submitted by Linda Crandall

CARE AND FEEDING THE GUPPIES

Behavioral Objectives:

1. The student will be able to describe a guppy.
2. The student will be able to identify the environment in which the guppy lives.
3. The student will be able to determine the proper amount of food to feed the guppy.
4. The student will be able to identify the guppy when shown an aquarium that contains a variety of fish.
5. The student will be able to relate how much his guppy has grown in comparison to others in the class.
6. The student will be able to explain and compare the growth from the start to the end of his guppy.
7. The student will be able to locate his own guppy by name recognition.
8. The student will be able to assist in feeding his guppy.
9. The student will be able to share the progress of his guppy with others in the class.
10. The student will be able to measure the correct amount of food and feed his guppy every other day.
11. The student will put a star by his name signifying he fed the guppy.
12. The student will learn how to take care and feed his individual fish.

Directions to the teacher:

Talk to the students about fish and what they look like, what environment they live in and what they eat. Show the students the jars of guppies and have each find his own name. Show the student how to feed the fish. Show the students the chart showing their names and have them put a star under the proper day.

Teach the children fingerplay "My Darling Little Guppy." Read the story, "The Guppy Who Changed His Name," 98 Stories, page 47. Teach the song, "Over in the Meadow." Art project will have the children make a picture of their guppies.

Magnet lesson may be taught by making small pictures of guppies and put a color tab on each and put in a box. The student will fish out the guppies with a magnet attached to a stick and tell what color is on each guppy.

Directions to the students:

What is a guppy? What is a fish? What does it look like? Where does it live? What does it eat?

Feeding the fish: Dip your thumb and pointing finger in the food. Rub your fingers together, the amount of food left is what you feed the fish. Put a star by your name. Make a picture of your guppy. Play the color game.

Materials:

Guppies, jars, sand, moss, snails, food, chart, story, paper, crayons, magnets, and box for pond.

Fingerplay:

My Darling Little Guppy

My darling little guppy,
Hasn't any toes;
He swims around without a sound
And bumps his hungry nose.
He can't get out to play with me,
Nor I get in with him,
Although I say, "Come out and play"
And he, "Come in and swim."

Song:

Over In the Meadow

Over in the meadow in the sand, in the sun,
Lived an Old Mother Toad and her little toadie one.
"Wink," said the mother, "I wink," said the one;
And he winked and he blinked in the sand in the sun.

Over in the meadow, where the stream runs blue,
Lived an Old Mother Guppy and her little guppies two.
"Swim," said the mother, "We swim," said the two
So they swam and they leaped where the stream runs
blue.

Over in the meadow, in a hold in a tree,
Lived an Old Mother Bird and her little birdies three.
"Sing," said the mother, "We sing," said the three.
So they sang and were glad in the hold in the tree.

22

Pre-school Submitted by Jane Hardesty

THE CHILD AND HIS ENVIRONMENT

Behavioral Objectives:

1. The student will be able to define how our world is interdependent and interrelated.
2. The student will be able to explain how man's behavior can create problems for wild animals.
3. The student will be able to state at least one specific instance in which man's behavior has harmed wild animals.
4. The student will be able to discover how man's actions can be harmful to animals.
5. The student will be able to explain how our world and animals are interrelated.
6. The student will be able to conclude that man's behavior is important in the survival of wild animals.
7. The student will be able to take a positive approach to helping wild animals remain alive and safe in the forest.
8. The student will be sure to "pick up" litter in any picnic area and be sure his parents drive carefully in the forest area.

Directions to the teacher:

Introduce the three hand puppets to the students. Encourage the students to take part in a conversation with the fox, rabbit, and bear. Use the hand puppets to tell the environmental story.

Directions to the students:

(These things would be drawn from the students as they talk with the puppets during the story.) Describe a forest How do people hurt animals' homes? What does a meadow look like? Who is most important in nature? You, or I, or a rabbit, bug, or a worm? Do we depend on animals.

Materials:

Three hand puppets - a fox, rabbit, and a bear. The Environmental Story, from Environmental Education Project (see the attached page.)

Comments:

Read the story Runnaway Giant, Richard Bennet, Hilton Press LTD. 1951. Discuss what would happen to the animals' homes if we aren't careful in the forest.

Read the story Little Cottontail, Carl Memling, Golden Press, 1960. Look at the pictures of the forest and the meadow. Discuss how animals must protect themselves. Also how animals are dependent upon each other for food.

Read Winnie-the Pooh, A. A. Milne, Whitman Publishing Co., 1960. Discuss how Pooh is careful in the forest, to keep his home and his friends' homes safe.

Request Smokey the Bear posters, leaflets, and pamphlets from the Wyoming Game and Fish Department.

The Environmental Story

Fox: Hello, children! My name is Felix and I am a . . . . Right! a fox. I live with my family in the forest. (Help the children describe a forest.) Do you like animals? Sometimes it seems to us that people don't like us very much. (Have the children give examples of how people harm the animals: forest fires, trash and garbage in the lakes and streams.) We creatures really need the help of you humans in order to live in peace. I guess I'll say goodbye now-have to go check on my cubs.

Rabbit: Whew! Is that fox gone? Tell me if you see him coming back. I just wanted to tell you a little about myself. I am Robert Rabbit, and I live in the meadow with my family. Do you know what a meadow is? (Help the children describe a meadow.) I have quite a few children and it's a terrible job keeping track of them! They are always getting lost in the tall meadow grass, and now I have another problem-a road has been built right through our meadow, and our whole life has been changed. It used to be that all we had to watch out for were hawks and foxes and dogs--but now it's cars! We are so afraid of cars-please tell your moms and dads to watch out for the little animals when they are out driving-OK? You know how your mothers worry about you getting hit by cars! OH! OH! The fox is coming back! Goodbye!

Fox: (Sniffing) I smell a rabbit. Where did he go? Say, I forgot something. Could you children do a favor for me, please? Remember the forest is my home and help me keep it neat if you ever visit there--and tell others, too. You children can be just as important as grown-ups if you set a good example. Hmmmmm. I think I hear a rather large animal coming. So long for now!

Bear: Well, well, so this is the class! I've heard there are many nice children here who are very interested in nature. Say, did you know that YOU are each a part of nature? Yes, nature is all around us. It is all the

air and water and sunshine and dirt and plants and birds and animals and YOU are animals, too! Did you know that? By the way, my name is Bert: Bert, the bear ... You have probably met my friend Smokey, haven't you? He has certainly been working hard teaching folks about fire safety. How about my other friend, Winnie-the-Pooh, do you know him, too?
He and I have both had our problems with bees and honey! Just a while back I found a lovely comb of honey up in a hollow tree in the forest-yum! But, oh, I got a tummy ache! Some humans had been spraying poisons around there to kill weeds and bugs and got some on the honey and that's what made me sick. I wish they'd be more careful because those poisons can even kill birds and animals.
I hope that you children don't ever eat things like grass and leaves out in the yard or park or field-you just never know when someone might have sprayed poisons around there.
Tell me, who or what is the most important thing in nature? (You, or I, or rabbit, or bug, or worm, etc.) Each one of us thinks he is the most important but we all depend on each other. Animals depend upon humans to leave their homes alone and leave them in peace. (Yellowstone Park: There the bears have been fed and teased by people. Now they sometimes bother the people and even hurt them to get more food--and yet the rangers tell the people not to feed the bears.) Do humans depend upon animals? (Discussion)
(Humans eat animals, get food from them-cheese, milk, etc. Humans have pets. Humans ride animals. Humans are animals for carrying and pulling things. Animals fertilize the forest, are interesting and/or beautiful. When they die their bodies turn into soil.)
So you see, we are important in nature. We can all live together if we respect each other and don't bother each other. I'm counting on you children to help us animals-will you? Good! So long now!

Second Activity

Behavioral Objectives:

1. The student will be able to define pollution.
2. The student will be able to explain pollution.
3. The student will be able to state at least one specific instance in which pollution has been caused by man's behavior.
4. The student will be able to point out at least one instance in which man has polluted his environment.
5. The student will be able to state how man's behavior is related to his environment.

6. The student will be able to conclude that he is capable of improving his environment.
7. The student will propose a "course of action" which would improve the conditions in his neighborhood.
8. The student will be able to improve his neighborhood by picking up litter.

Directions to the teacher:

Discuss a family picnic with the children. Ask how they can tell if someone has been there before? Was this a good way to leave a picnic area? Do animals leave trash and garbage behind?

Directions to the students:

Learn three new words: "litter", "environment", "pollution." What do you like about your environment? Do you see things wrong with it? Where does pollution come from? What can we do about pollution?

Materials:

Pictures of a family on a picnic. Pictures after the family has left the area. Pictures of pollution in the neighborhood.

Comments:

Take a walk around the school grounds to collect "litter." Collect litter on the way home and to school. Collect litter from the bus.

Third Activity

Behavioral Objectives

1. The student will be able to describe how bulbs grow.
2. The student will be able to explain how to plant and grow bulbs.
3. The student will be able to state one reason why bulbs should be planted.
4. The student will be able to relate the bulb story to planting and growing bulbs, both at home and at school.
5. The student will be able to tell the bulb story again to the class.
6. The student will be able to relate the planting of bulbs to changing and improving his environment.

Directions to the teacher:

Discuss with the children why there are plants. Ask if any of their families have planted flowers? Discuss why we should plant flowers. Introduce the flannel board story "The Little Bulb."

Directions to the students:

Where do plants come from? (show examples of bean seeds and bulbs.) Why do people plant seeds? How do seeds and bulbs grow? Would you like to plant bulbs around our school?

Materials:

Bean seeds; tulip bulbs, or any other bulbs you desire to plant; charts containing pictures of the tulips, etc. after they have grown; (can be obtained from flower magazines.); the flannel board story, "The Little Bulb."

The Little Bulb

Down in mother earth, a tiny little bulb was sleeping, safely wrapped in a many-layered jacket. The little bulb had been asleep for a long, long time and now somebody thought it was time for him to wake up.

That somebody was an earthworm that lived close by. He had been creeping about and found that all the bulbs in the neighborhood had roused themselves and were pushing their roots down in the earth and lifting their heads up through the soil into the bright sunshine and fresh air.

When the worm saw the little bulb still sleeping it cried, "Oh, you lazy fellow, Wake up. All the bulbs are awake and growing and you have slept long enough."

"But how can I grow or move at all in this tight jacket?" said the bulb in a rather drowsy tone.

"Why push it apart. That's the way the other bulbs have done. Just move and it will come off."

The little bulb tried and tried but the tough layers wouldn't break. And all the time the worm was telling him how happy the other bulbs were now that they had lifted their heads into the sunshine.

"Oh, oh dear!" said the bulb. "What shall I do?" "I can't break those layers and I shall never see the beautiful sunshine. Besides, I'm so sleepy I just can't keep awake any longer." And he fell asleep again.

"The lazy fellow," thought the earthworm. "But it is strange that the other bulbs shed their layers so easily. Who could have helped them I wonder?"

The little bulb slept soundly for a long while but at last he awoke and found his layered jacket soft and wet instead of hard and dry and when he moved about, it gave way entirely and dropped off. Then he felt so warm and happy that he cried, "I really believe I am going to grow after all. Who could have helped me take off my layered jacket? And who woke me I wonder? I don't see anyone nearby."

"I woke you," cried a soft happy voice close by. "I'm a sunbeam and I came down to wake you and my friend the rain drops moistened your layered jacket so that you might find it ready to slip off."

"Oh thank you," cried the bulb. "You're all very kind, will you help me to grow into a plant, too?"

"Yes," said the sunbeam. "I'll come as often as I can to help you and the rain drops will come too; then if you work hard, with our help you will become a beautiful plant, I'm sure."

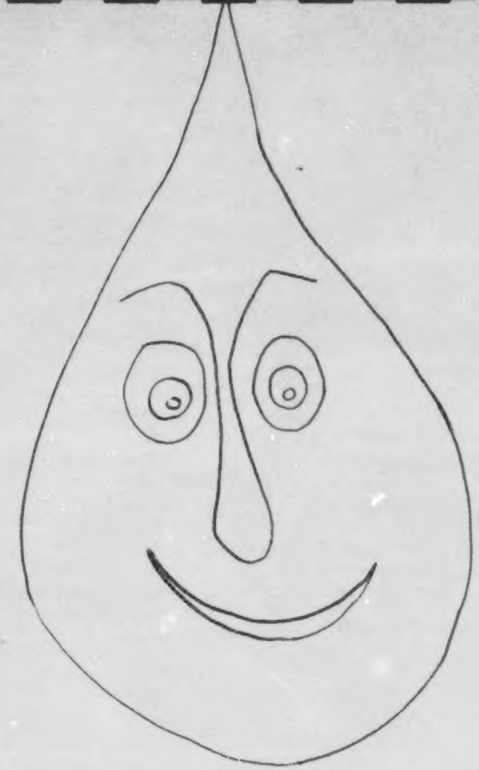
"But," said the bulb, "how did you know I was sleeping here? Could you see me?"

"No," said the sunbeam, "But I come to visit almost every day and some days when I don't come the rain drops come."

"Oh, how can I ever thank you?" asked the bulb.

The sunshine said, "Grow into just the best flower that you possibly can."

So the bulb grew into a beautiful flower that climbed higher and higher towards the sky.



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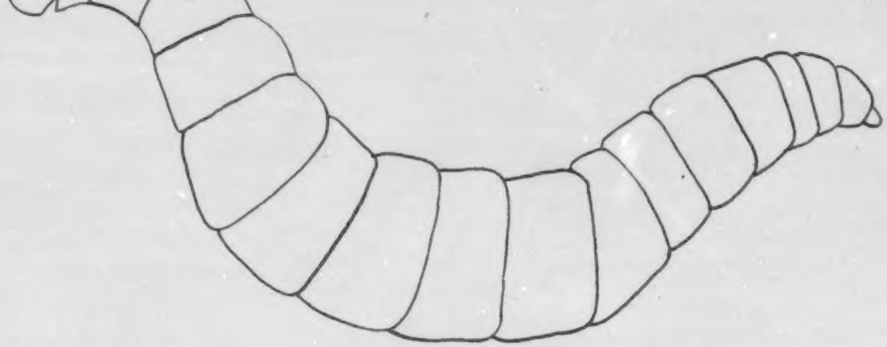

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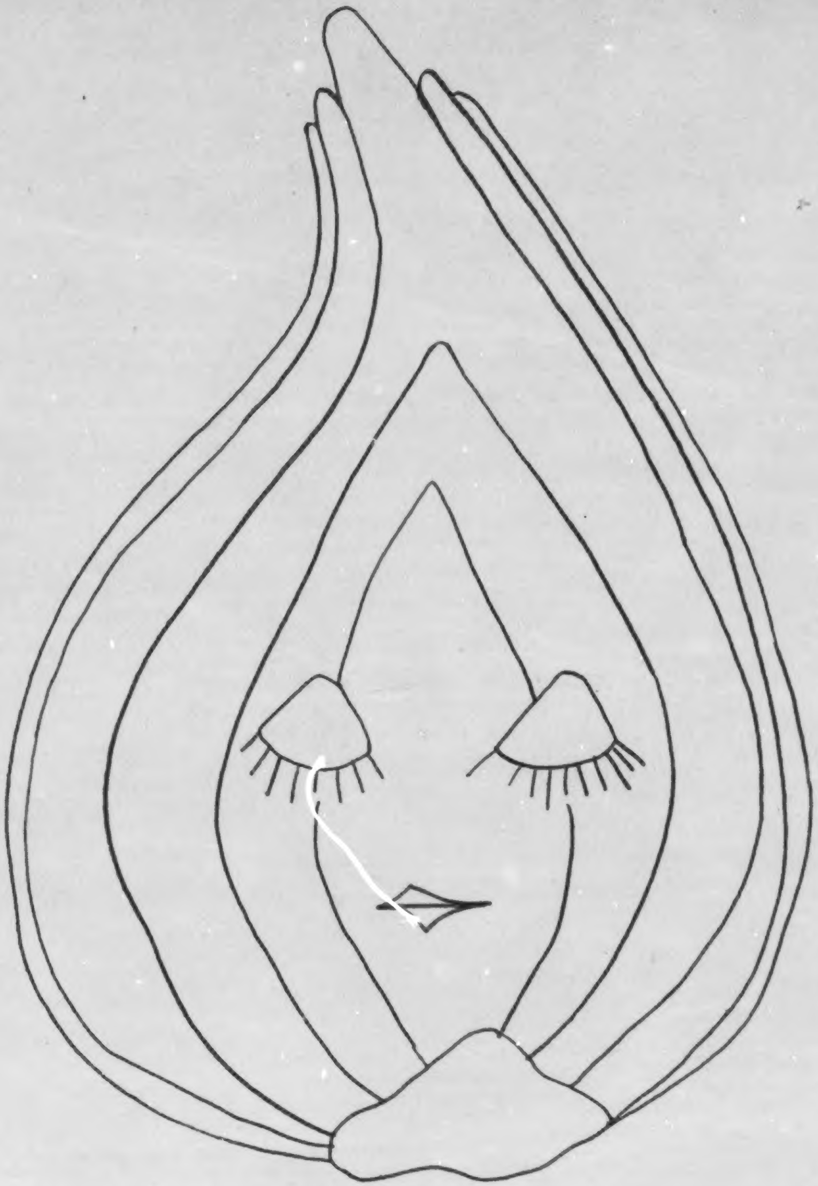

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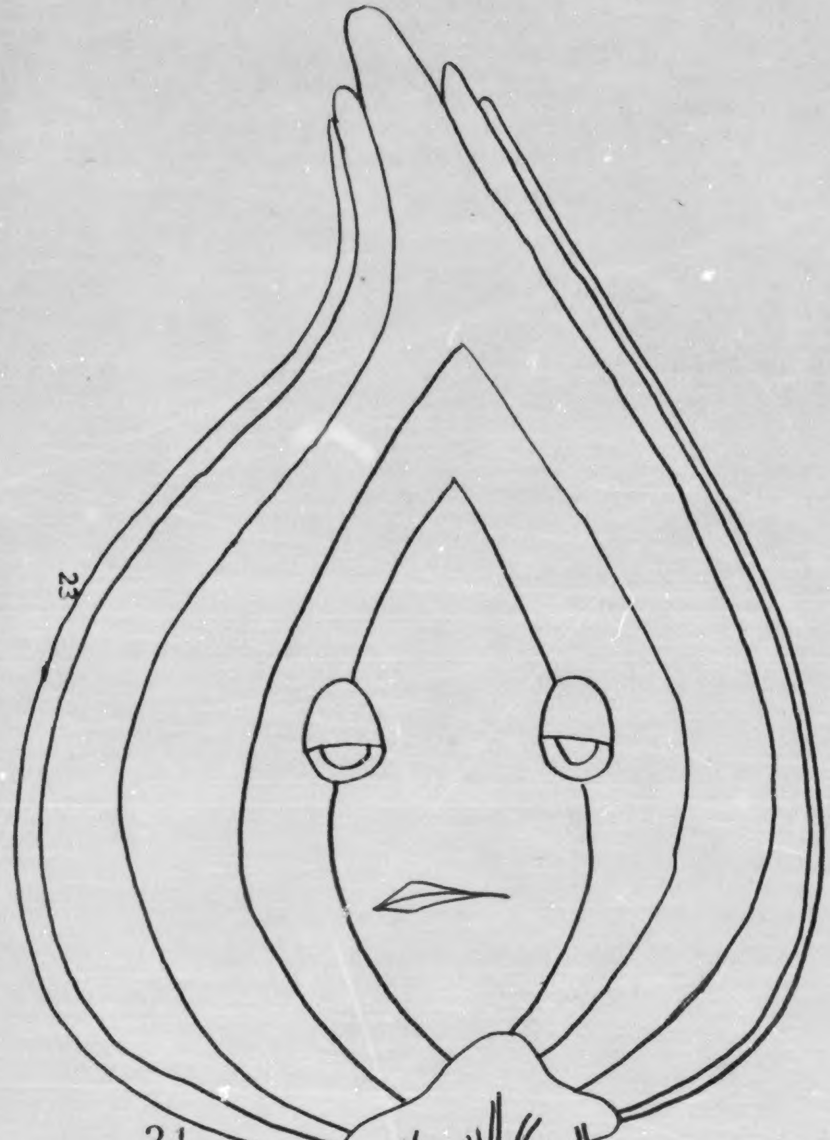

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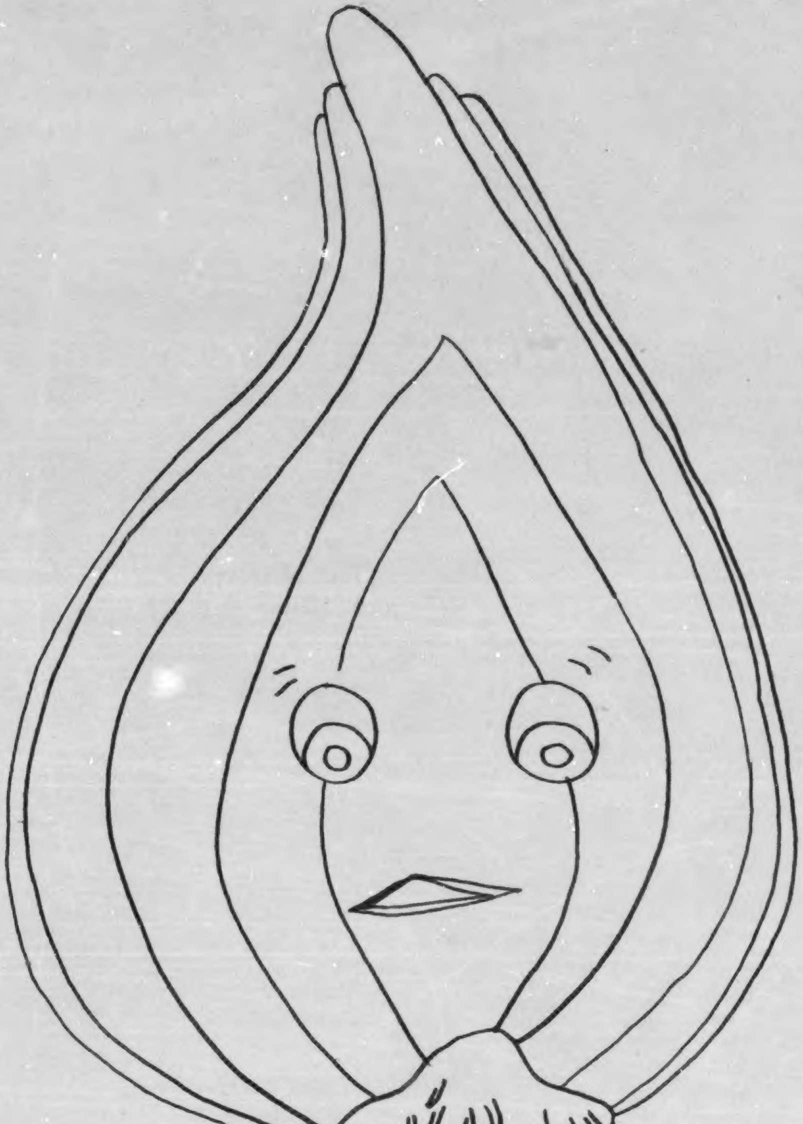

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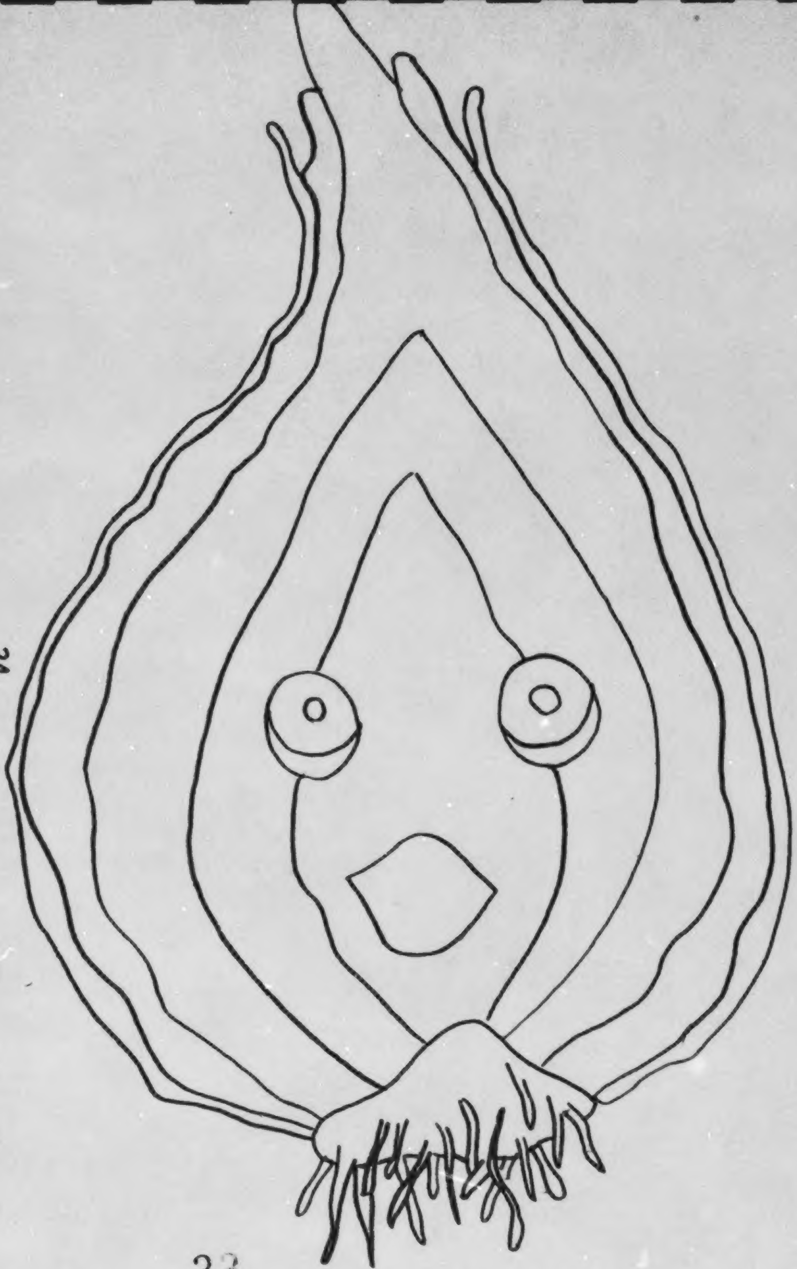

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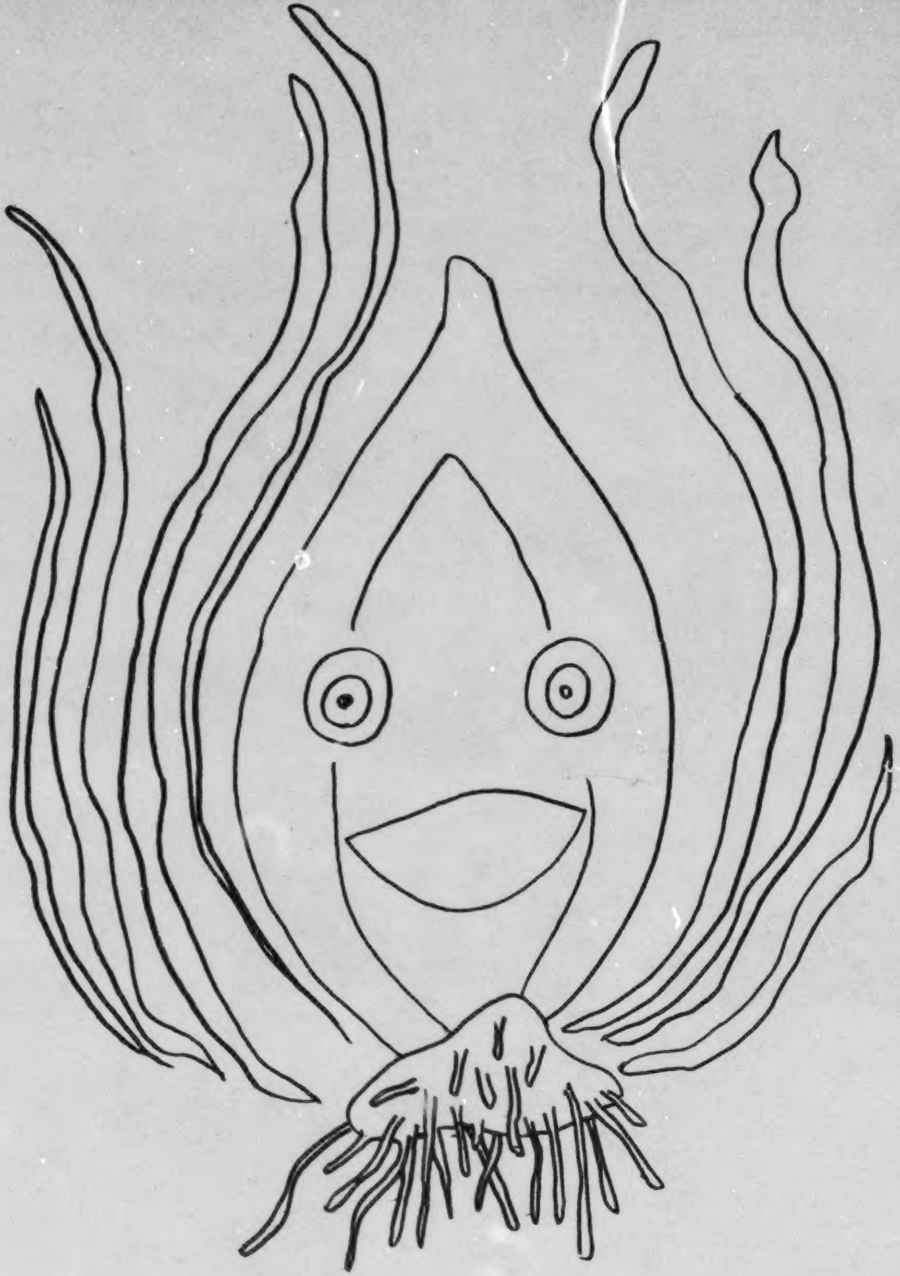

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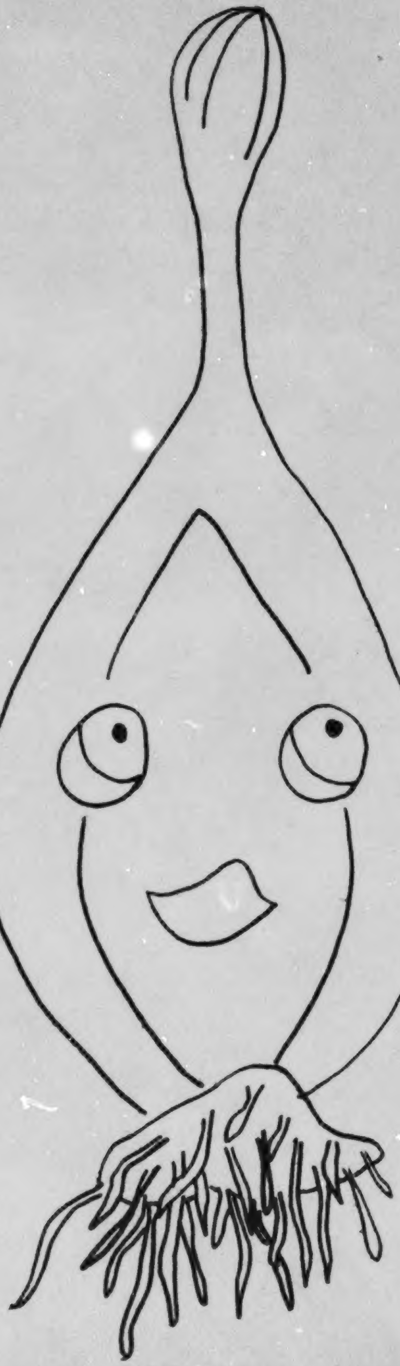

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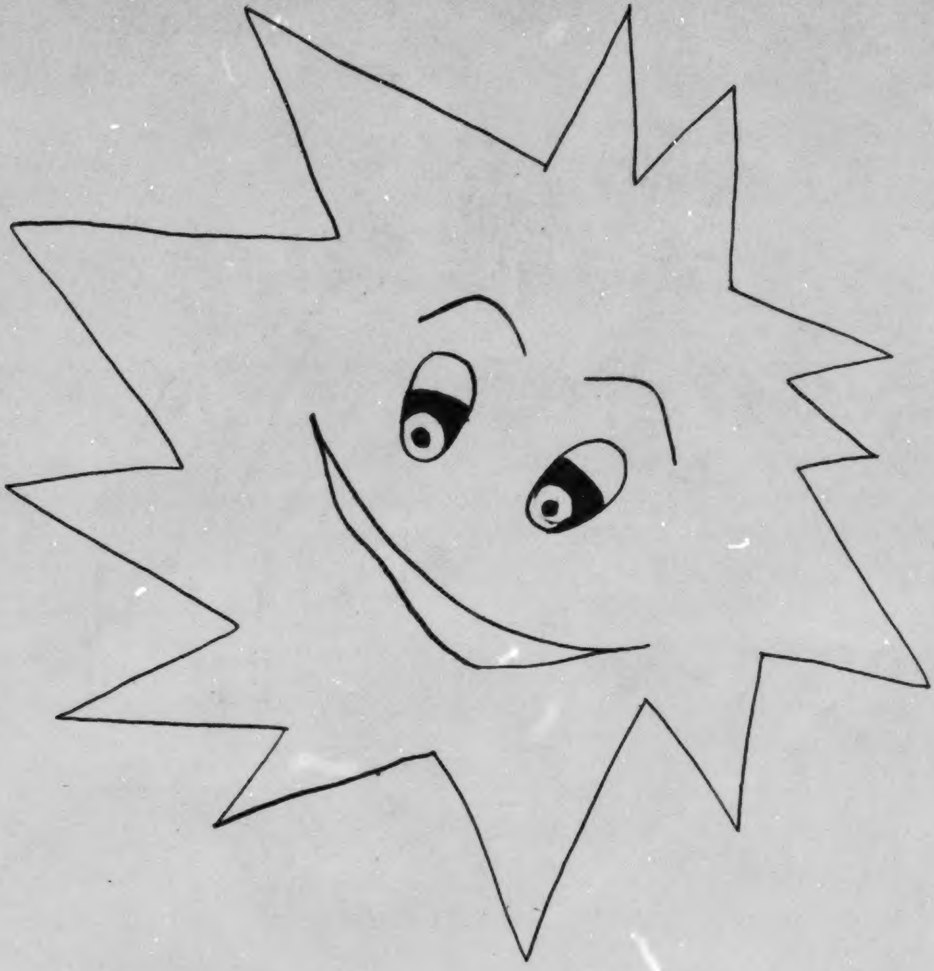

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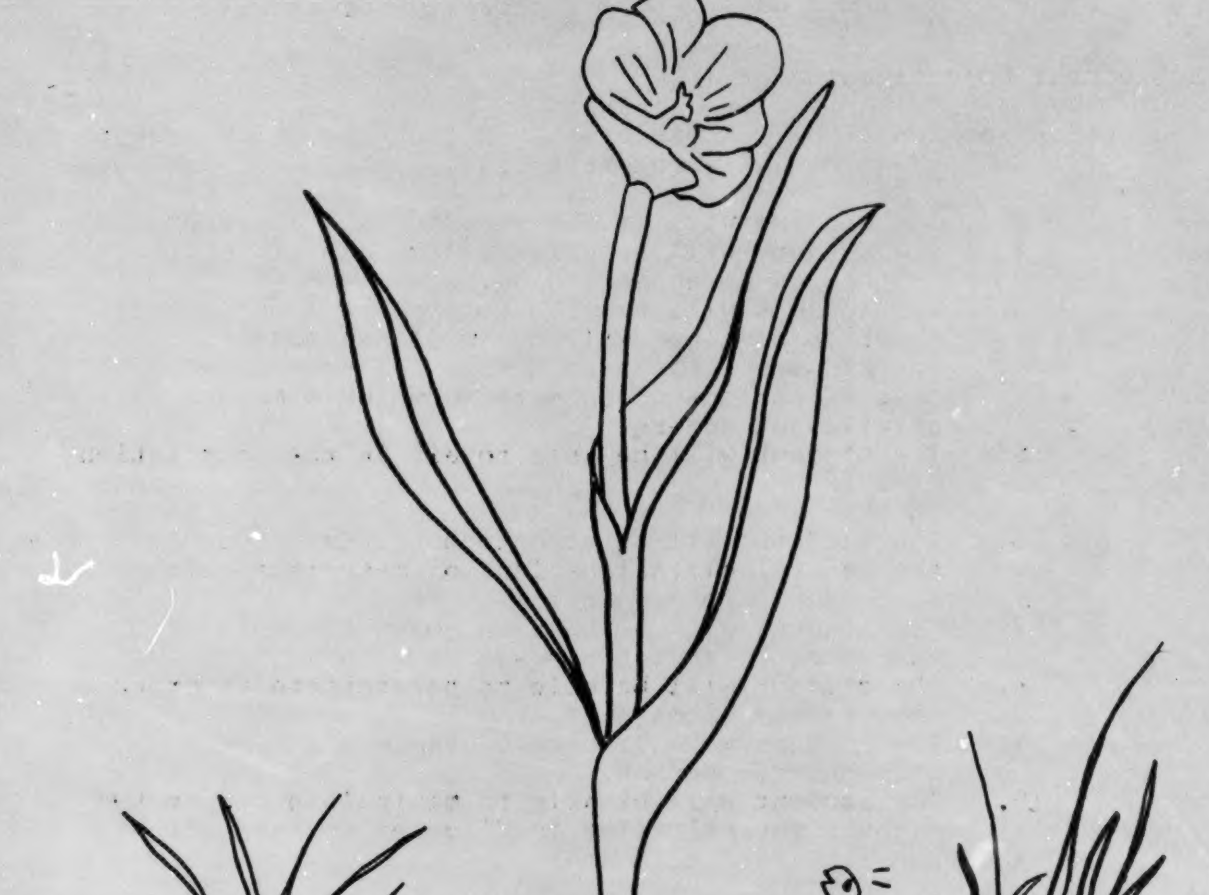


Kindergarten Submitted by Jane Houston

WHAT CAN YOU DO WITH A MAGNET?

Behavioral Objectives:

Cards No. 1 and No. 2. Discovering objects to which magnets are attracted.

1. The student will be able to describe a magnet.
2. The student will be able to describe at least two things a magnet can do.
3. The student will be able to predict some objects to which a magnet will and will not adhere.
4. The student will be able to infer several general classifications of objects to which a magnet will or will not adhere.
5. The student will be able to aid in the compilation of a list of objects in the room to which magnets stick.
6. The student will be able to conclude correctly the general classifications of materials which will adhere to magnets.
7. The student will be able to go to the science center at least two times.
8. The student will be able to participate in group discussions of magnets.
9. The student will be able to share his findings with another person.
10. The student will be able to manipulate one or two magnets several times to discover objects which are attracted to magnets.

Behavioral Objectives:

Card No. 3. Magnetizing a pin.

1. The student will be able to state that rubbing a pin in one direction on one pole of a magnet will magnetize the pin.
2. The student will be able to explain how to magnetize a pin.
3. The student will be able to manipulate a pin and magnet in such a way as to magnetize the pin.
4. The student will be able to infer that other objects such as a nail or a screwdriver can also be magnetized.
5. The student will be able to categorize objects which may and may not be magnetized in this manner.
6. The student will be able to conclude that only iron and steel objects may be magnetized.
7. The student will be able to choose to attempt this activity.

8. The student will be able to help others do this activity and/or be able to discuss this activity in a group.
9. The student will be able to successfully magnetize a pin or other object.

Behavioral Objectives:

Card No. 4. Seeing Magnetic Poles

1. The student will be able to name the two poles of a magnet and state that they can be visually detected.
2. The student will be able to distinguish the poles of a magnet.
3. The student will be able to discover the magnetic poles through his participation in this activity.
4. The student will be able to tell how to find the magnetic poles of a magnet.
5. The student will be able to conclude that the magnetic poles of a magnet may be discovered visually because they are the strongest part of the magnet.
6. The student will be able to point to the poles of a magnet.
7. The student will be able to report to the group or the teacher that he can "see" the magnetic poles.
8. The student will be able to join with others in performing this experiment and share the results of the activity with others.
9. The student will be able to shake staples on a paper covering a magnet until he can discover the poles.

Behavioral Objectives:

Card No. 5. Constructing a Magnetic Compass

1. The student will be able to describe the making of a compass after watching a demonstration or "reading" the card.
2. The student will be able to explain one method of constructing a compass.
3. The student will be able to demonstrate the making of a compass.
4. The student will be able to point out how a magnetic compass works.
5. The student will be able to create a magnetic compass.
6. The student will be able to compare the constructed compass with a commercial one and explain how they work.

7. The student will be able to describe a compass.
8. The student will be able to assist in making a compass.
9. The student will be able to initiate or join a friend in making a compass.
10. The student will be able to, alone or with one or two others, float a magnetized needle to discover that one end points north.

Behavioral Objectives:

Card No. 6. Making an Electromagnet

1. The student will be able to describe an electromagnet.
2. The student will be able to distinguish an electromagnet from another type of magnet.
3. The student will be able to demonstrate how an electromagnet operates.
4. The student will be able to identify an electromagnet.
5. The student will be able to create an electromagnet.
6. The student will be able to compare an electromagnet with a permanent magnet.
7. The student will be able to participate in a discussion of electromagnets and how they are made.
8. The student will be able to report his attempts to construct an electromagnet.
9. The student will be able to alone or with a friend, make and operate an electromagnet.

Directions to the teacher:

Prepare Concept Cards concerning experiments or projects concerning magnets. Catalogs of school supplies, old textbooks, etc., are good sources of pictures. These cards could be covered with clear contact paper or laminated. Some sample Concept Cards are attached. They include:

Objects which attract magnets and those which do not. The objects are all things within the classroom.

Similar to first card, except a few items not in the classroom are included to see if students are able to project their conclusions from the first card.

How to magnetize a pin. Sketches show pin being rubbed one way on one pole of a magnet and then being placed close to some other pins. What will happen?

This card demonstrates collecting used staples in a paper cup and then pouring them onto a sheet of paper covering a bar magnet. Where do most of the staples collect?

This card demonstrates the way to make a magnetic compass by floating a magnetized needle in a bowl of water. Does the needle always point the same way?

The last card shows how to construct an electromagnet using a battery with two binding posts.

Provide for an accessible area to keep cards, related equipment and materials. Plan so that students have time to work there, individually or in small groups.

Introduce cards, one concept at a time, to be sure students understand process and can "read" picture directions. Be sure to avoid pointing out conclusions.

Arrange for larger group discussions to compare findings, to talk about other activities in this area, to draw conclusions, to relate projects to everyday living and to record important material.

Offer to record findings or results, if appropriate, on chart paper. This might be shared with larger group from time to time. If students wish, these charts could be duplicated so each student illustrates his own "Science Book" to take home.

Directions to the students:

Listen carefully to directions so you will know how to use this card. Take turns using cards and equipment so that everyone can have an opportunity to try these experiments. If you need help, ask someone else in the science center. If they are unable to help you, ask your teacher. See how many new things you can discover. If you want your findings written on a chart, ask an adult to do this for you.

Materials:

Science center, concept cards, chart paper, an adult to help as necessary. Materials to go with cards of magnets; several bar and horseshoe magnets; pins and needles; dish (non-metallic) and store used staples; paper (scraps of toilet paper are good to float the needle and 8 1/2 X 11 duplicator paper covers one or more bar magnets); three inch nails; two-pole, dry cell battery - one lasts all year; two pieces of covered copper wire, each about two feet long; and tacks (or pins) to test the electromagnet.

Comments:

Math correlation: There is an opportunity for a good deal of counting in these projects. How many pins cling to this magnet? How many to another magnet? Which number is greater? How many things did you find that stick to a magnet? Can you rub the magnet 30 times. How many times did you wrap the wire around the nail?

Reading and language: What does the chart say? Tell what happened in your experiment. Dictate the words you want written on the chart. Guess what it says on the top of this card. Explain what happened when you followed the directions on the card. What letters would you use to print the word "magnet"? Can you think of other words that start like magnet?

Art Correlation: If children choose to make science books, the illustration of these books would offer an opportunity for art activities. Students often make paintings of favorite activities. Models are often made by kindergarteners. A clay battery with a string to a red pet "nail" and back is almost as much fun as the real experiment as well as good review.

Music and literature correlation: There are probably not too many songs and stories about magnets and the ones that come readily to mind are not very appropriate. Perhaps this is a good opportunity to make up songs and stories. They could be recorded for the science books or put on tape to be used in the listening center.

Movies, filmstrips, books, and other audio-visual are available at the A.V. Office and the library. Especially good-though quite old- is the movie, "Mickey and His Magnets." There are a number of picture books written for your children which are fun to read and show pictorially the many activities with magnets.

Social Studies correlation: How are magnets used in everyday living? Do you have any magnets in your home? Where? (radio, telephone, TV, motors, etc.)

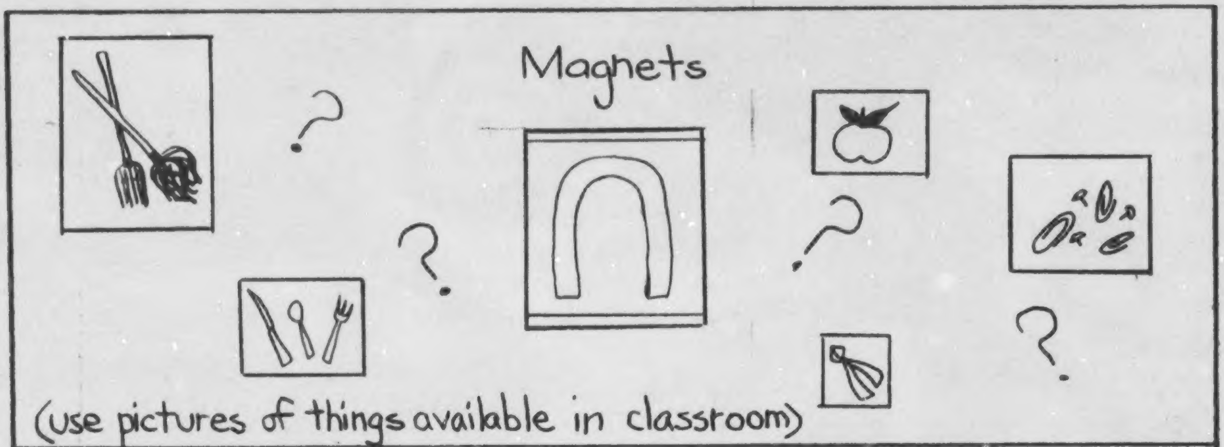
Ecological implications: Why is it good to collect used staples and reuse them? What happens if they are thrown away? From where did the staples come? Where did the store get them? Where did the factory get the metal? What else is dug from the ground that we use? How did electricity get in the battery? Where else does electricity originate? What else is inside a battery? Where did these things originate?

The same system of concept cards could be used in many other areas--colors, magnifying glasses, making soil, prisms, evaporation of water, planting seeds, eliminating litter, or electricity. One could also use matching cards in various areas such as: homes of animals, pollution and non-pollution, food from under or above the ground, etc.

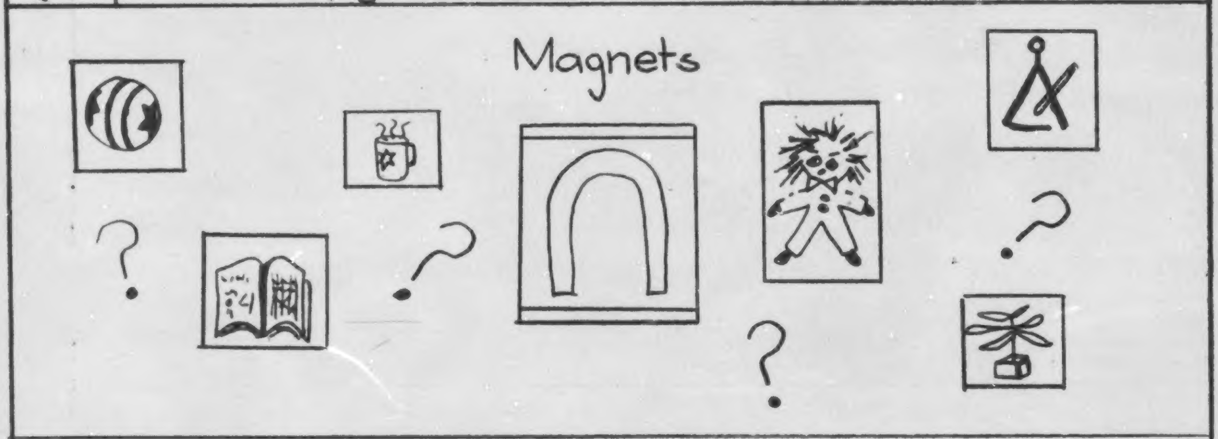
Other areas of magnetism could be covered in group discussions or put on Concept Cards. As the unit progresses, discussions or concept cards might be needed to clarify such things as: like poles repelling and opposite ones attracting, where and what is the magnetic pole (across the street from Santa Claus?), where will a bar magnet point if held by a string, what happens if a magnet is dragged in the dirt? Concept cards may be used advantageously following discussions as well as preceding them.

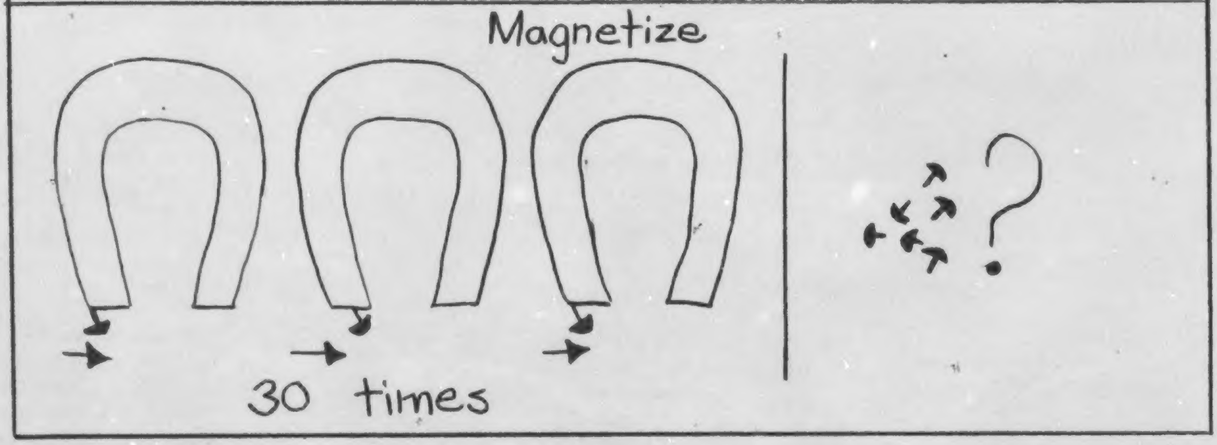
CONCEPT CARDS

1. Magnets - attracted to?
2. Magnets - attracted to?
3. Magnetize a pin
4. Magnetic Poles - how to see
5. Magnetic Compass - how to make one
6. Electromagnet - how to make one



(use pictures of things available in classroom)





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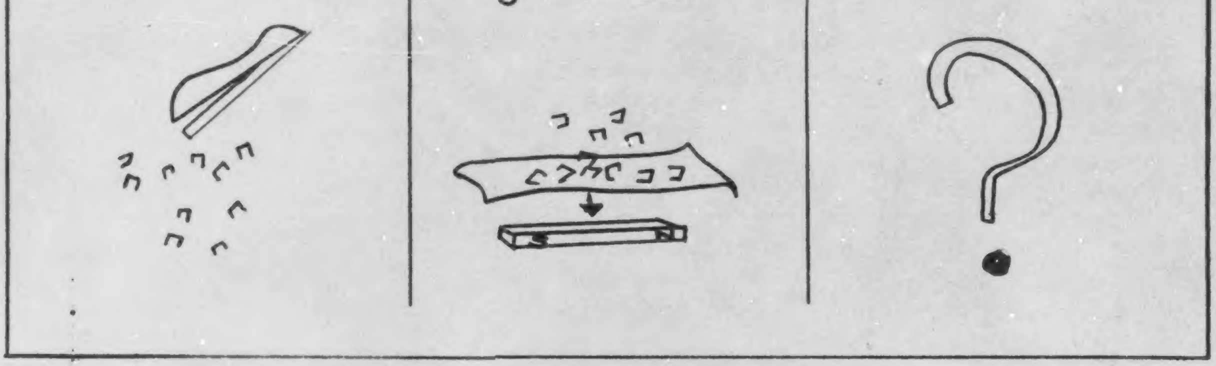
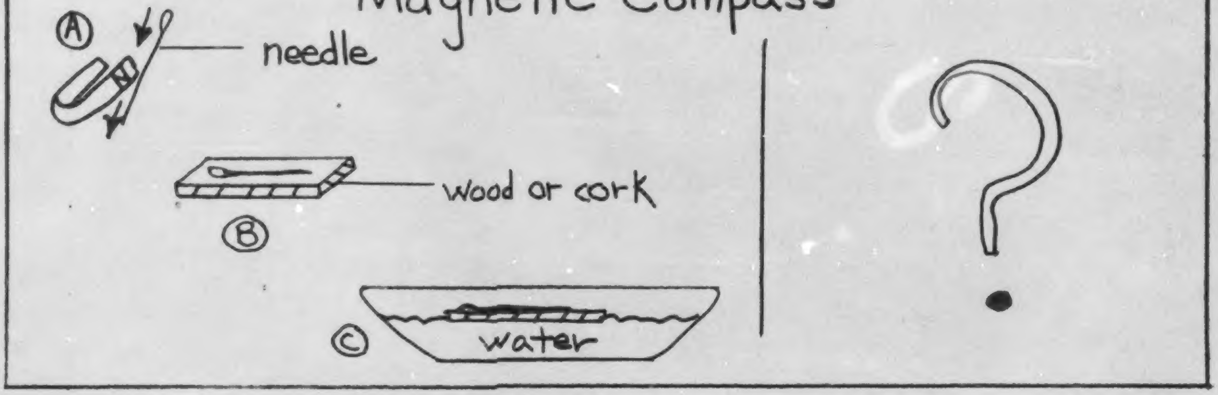
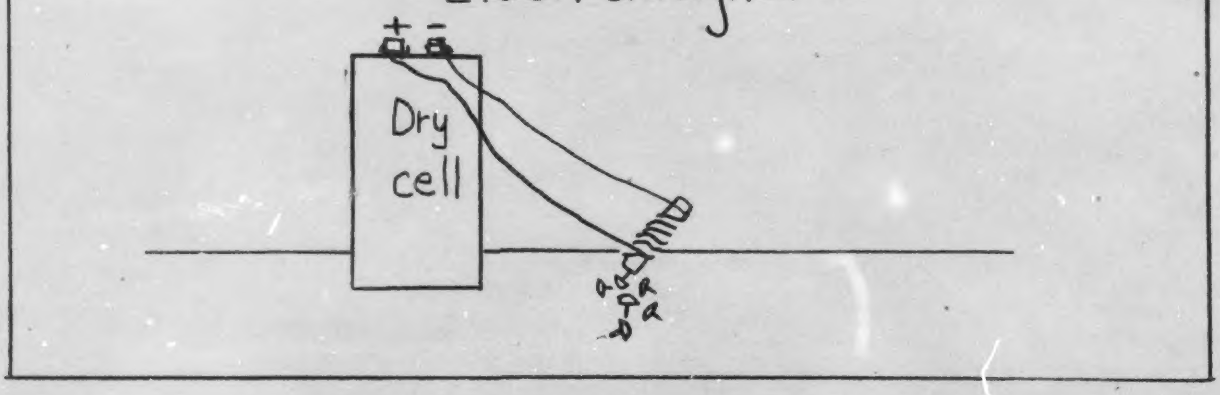
Magnetic Poles



Magnetic Compass


Ⓐ
needle
wood or cork
Ⓑ
Ⓒ
water

Electromagnet



Kindergarten Submitted by Kathleen Meade

EXPLORING THE PUMPKIN

Behavioral Objectives:

1. The student will know how the fruit of the pumpkin tastes, ways the seeds can be used and how the pumpkin reproduces itself.
2. The student will be able to tell at least two uses of the pumpkin fruit and seeds.
3. The student will be able to assist in preparation of pumpkin and seeds for consumption.
4. The student will be able to aid in selection for purchase of a pumpkin suitable for many related activities.
5. The student will be able to carry-over into the home the knowledge and enthusiasm for the full use of food stuffs such as the pumpkin.
6. The student will be able to transplant seedlings begun in class and care for them during the summer and harvest his crop in the fall.
7. The student will insist parents make full and complete use of future pumpkins purchased; jack-o-lanterns, pies, roasted seeds, planting seed for future harvests.
8. The student will be able to continue nature's life cycle by planting seeds and knowing how to care for them.

First Activity: Carve two pumpkins into jack-o-lanterns (one in each kdgn. session).

Directions to the teacher:

Emphasize physical characteristics of pumpkin before, during and after carving. Each child gets a turn to empty pumpkin shell of seeds and strings. Children choose geometric shapes, teacher cuts face. Wash seeds and spread to dry. Direct interest and discussion so that students themselves express desire to make a pumpkin pie. Refrigerate jack-o-lantern for future use. Place one jack-o-lantern where it can be easily observed daily.

Directions to the students:

What color, texture, odor do you sense? How do the seeds and strings feel, smell? How does the inside compare to the outside? How can pumpkins be used? What could be done with them when Halloween is over? How would you like to use this pumpkin.

Materials:

Pumpkins, knife, newspapers to carve on, skin to wash seeds, and access to refrigerator or cooler.

Comments:

This activity precedes Halloween Party. Correlated activities for the day:

Song: "I'm a Jack-O-Lantern" The Kingergarten Book.

Math: Discuss geometric shapes

Language arts: learn fingerplay "Five Little Jack-O-Lanterns"

Five little jack-o-lanterns sitting on a gate
This one said, "My it's getting late."
This one said, "I hear a noise."
This one said, "It's only some boys."
This one said, "Let's run."
This one said, "It's Halloween fun."
"Puff went the wind. Out went the light,
Away ran the jack-o-lanterns on Halloween Night."

Science: Discuss mold, what it is, why and what is needed for its growth.

Art: Ditto large pumpkins on 9 by 12 inch orange construction paper. Students can cut this out and add their own faces by free-hand cut geometric shapes.

Second Activity: Observe pumpkin kept at room temperature for mold growth. Prepare refrigerated pumpkin for cooking, and cook.

Directions to the teacher:

Cut pumpkin which has been kept refrigerated in half. (Reserve half of the pumpkin for second kindergarten session.) Peel and cube pumpkin (depending on maturity of group, decide whether students or teacher peel and cube pumpkin.) Cook until soft. Rub through colander or use blender. Store in covered container in refrigerator.

Directions to the students:

Observe and feel the peeling. How do we know the water is hot enough to cook the pumpkin pieces? bubbles, boiling, steam, etc.) Where did the steam come from? What happens to the pumpkin during cooking? (softens, squishy) Why does it go through the colander so easily? (the cooked pumpkin) Why should we keep it in the refrigerator?

Materials:

Pumpkin; knife and spoon; water, electric sauce pan, or hot plate; colander or blender; covered container to store cooked pumpkin in; refrigerator or cooler.

Comments:

Correlated activities for the day:
Song: "In a Pumpkin Patch" Singing Fun, p. 9

Language arts: Story Danny's Luck by Lavinia Davis
Doubleday Publishers, 1963.
Math: Compare amount of uncooked to amount of sieved pumpkin.
Science: Discuss properties of water, liquid and gas. Pumpkin kept at room temperature may be showing signs of mold growth; how, why and what is needed for mold growth.

Third Activity: Observe pumpkin kept at room temperature for mold growth. Make pumpkin pie or custard.

Directions to the teacher:

Pre-measure ingredients for pie filling and crust. Emphasize names of ingredients as they are combined: discuss where they came from (i.e. eggs-chickens). Call attention to the spices and correlate with "Columbus Day" activities of a few weeks before.

Using a portable oven to bake pie is an advantage as baking process can be observed and smelled. Length of school day will decide if "pie" is eaten today or kept refrigerated for tomorrow.

Directions to students:

What do we need to make a pumpkin pie? Why do we stir all the ingredients together? Why pre-heat oven?

Materials:

Cooked pumpkin and mixing bowl; recipe and needed ingredients, baking pan, measuring spoons, cups, other necessary equipment; portable oven or access to oven.

Comments:

Correlated activities for the day:
Song: Three Little Pumpkins, Singing Fun, p.7
Language arts: Discuss new vocabulary i.e. ingredients, recipe, spices, blend, mix, bake, pre-heat etc. Write experiences short story. Story: Magnificent Pumpkin by Valdine Plasmate, Viking Press, 1959.
Math: review measuring terms necessary to measure and assemble ingredients for pie filling and crust.
Science: Continue to observe and discuss changes occuring to the pumpkin kept at room temperature.

Fourth Activity: Observe pumpkin kept at room temperature for mold growth. Roast pumpkin seeds.

Directions to the teacher:

Melt margarine in baking pan or dish; add pumpkin seeds and salt. Bake at moderate temperature (375) for five to ten minutes. During baking process call attention to odor and changes going on in the oven.

Directions to the students:

How did the seeds look before, during and after baking? Why use margarine and salt? How do the seeds taste? Would pumpkins and their seeds fill a need for wild animals?

Directions to the students:

How did the seeds look before, during and after baking? Why use margarine and salt? How do the seeds taste? Would pumpkins and their seeds fill a need for wild animals?

Materials:

Seeds, margarine and salt; oven

Comments:

Correlated activities for the day:
Song: Pumpkins and Turkeys, More Singing Fun, p. 23.
Language arts: Story Proud Pumpkin by Nora Unwin,
Alladin Press, 1953

Fingerplay: Growth of a Seed
I'm just a little seed,
I'm planted in the ground
First the rain will fall,
Then the sun will shine.
My stem will soon spurt up,
Soon I'll be a vine.
I'm growing every day,
I get bigger by the hour.
See my great big leaves,
I'm a lovely pumpkin flower.

Fifth Activity: Plant pumpkin seeds; observe growth and changes that take place; if done in the spring of the year, they can be transplanted outside after no danger of frost.

Directions to the teacher:

It is interesting to use several glass containers where seeds can be observed during sprouting and growth. Several glass jars can be used, planting seeds at different depths for comparison growth-rates; place some in the dark and some in the sun.

Try sprouting several seeds on heavy blotter paper. Each student needs a container so he may take his own plants home after several inches high. Keep several plants in the room to show need for transplanting in larger containers during the growth cycle over several months.

Directions to the students:

What is needed to plant seeds? What do the seeds need to grow? What changes do you think will take place over the weeks to come? Which seeds will grow better, the ones that receive plenty of sun or the ones in the dark?

Materials:

Pumpkin seeds and empty containers; soil of suitable potting material

Comments:

Correlated activities for the day:
Song: Little Seeds, Singing Fun, p. 33
Arts and Crafts: Make a mural depicting the life cycle of a seed.
Language arts: Story, Pumpkin Moonshine by Taha tudor Walck, 1938.

Fingerplay: Dig a Little Hole
Dig a little hole,
Plant a little seed,
Pour a little water,
Pull a little weed.

This is my Garden
This is my garden,
I'll rake it with care.
And then some seeds,
I'll plant in there.
The sun will shine,
And the rain will fall,
And my garden will blossom
And grow straight and tall.

Kindergarten Submitted by James Zachman

RAISING HAMSTERS AS PETS

Behavioral Objectives:

1. The student will be able to describe a hamster.
2. The student will be able to give two examples of the behavior of the hamster.
3. The student will be able to demonstrate the proper way to feed and water the hamster in its home.
4. The student will be able to select pets that would be desirable to keep in a classroom.
5. The student will be able to paint a picture of his pet hamster.
6. The student will be able to compare the basic needs of the hamster with those of other animals.
7. The student will develop an attitude that indicates a genuine concern for the welfare of pets and animals.
8. The student will feed, water, and clean the cage of the hamster at least two times during the year.
9. The student will explore the general area of raising and caring for pets by means of development of a specific unit or project of caring for hamsters in the classroom.

Directions to the teacher:

Plan time and resource information for student discussion and activity items listed under directions to the students. After the class has discussed different kinds of pets, provide information about the hamster.

Examples of information: It is a short tailed rodent that weighs three or four ounces. It has a short body with soft fur, black eyes, large cheek pouches, and tiny hands. It is a clean animal with no body odor, lice or fleas.

Help students decide how to select a hamster. Purchase the animal when about three weeks old, if possible, as the young are easier to train than adults. Acquire one or in pairs. If you do not wish to raise young, two males or two females will live together harmoniously.

Provide information for the students concerning home (cage) needs of the hamster. Examples of information: The cage must be made of metal. The cage should have a removable pan for sanitary reasons. A water bottle with drinking tube is needed. Exercise equipment should be provided. Arrange a visit to a pet store. At the desired time acquire hamster and cage. Have the students plan cooperatively for the future care of the pet and continuation of the project.

Directions to the teacher:

Topics for discussion: Why do people have pets? What kind of animals do people have for pets? How do people get pets? What kind of a home do pets need? What are other needs of pets?

What kinds of pets would be practical to keep in a school room? Why? How do animals show us that they love us? Why should we be kind to animals? What are some ways we can show our love for pets? What things can be of danger to pets?

Suggested activities:

Visit a pet store. Have a pet show. Read poems and stories about pets and animals. (An adult or an older student could read to the group.) Examples: Animal Babies by Helen Fletcher or Mother Goose Rhymes.

Listen to, and sing songs about pets and animals. Draw your pet or a pet you would like to have. Make animal models from clay. Find pictures of animals and bring them to school for the bulletin board. Make posters, i.e., during "Be Kind to Animals" week. Have a puppet show using toy or "paper sack" animals. Plan a pet shop with stuffed animals.

Discuss the needs and habits of a hamster. (the teacher could arrange for presentation of the necessary parts of this information.) Plan together for the feeding and care of the hamster (or hamsters), on a sharing or "taking turns" basis. Continue to care for the hamster as planned, observing its habits and activities. (The teacher would plan this continuing activity to help reach the stated objectives.) Encourage the participation of all the students.

Materials:

Hamster (or hamsters), cage, water bottle with fittings, playground items (ladder, treadmill, and sand box) and hamster food.

Books:

The Pet Show by Blough, Row Peterson
The Lives of Animals by Anderson, Creative Educational Society, Inc.
Adventures of Bunny Rabbit, Britannica Press
Bear Cub by Clark, The Viking Press
The Deer at our House by Caldwell, Collier Books
Dog Stories by Dolch, Garrard Publishing Co.

Nappy Chooses a Pet by Hogen, Dutton
The First Book of Wildlife Sanctuaries by Harrison, Franklin, Inc.
Animals Do the Strangest Things, by Hornblow, Random House
The True Book of Animal Babies by Podendorf, Childrens Press
The True Book of African Animals and Animal Homes by Percell, Childrens Press
Animals From All Over the World by Lindquist, Simon and Schuster
Come Summer Come Winter by Shannon, Albert Whitman & Co.
Animals on the Move by Sutton, Rand McNally & Co.
Come to the Pet Shop by Tensen, The Reilly and Lee Co.

Poetry:

Time for Poetry by Arbutnot
The Illustrated Treasury of Poetry for Children, Macrae-Smith Co.

Audio Visual Aids:

Buying a Pet	FS K6
Going to the Zoo	FS W16
Tame Animals	FS IH66
Wild Animals at Home	FS 114
Wild Animals of North America	FS 112
Animals	Kit 114
Animal Differences	FS IH67
Animal Adaptations	FS A22
Animals in Spring	MP 3
Animals of North America	FS D2
Animals of the Zoo	FS A23
Animals to Know	FS A25
Animals and People	FS IJ55
Bear Country	MP 86
The Beaver	PS 4
Bird and Animal Babies	FS A30
Black Bear Twins	MP 6
How Animals Live	FS IA87
Mammals Are Interesting	MP 21
Little Red Hen	Tape 70

Songs about pets:

The American Singer contains assorted songs about pets. (First Book)
The First Grade Book, Ginn, Also contains songs about animals and pets.
Carnival of the Animals   Record 2

Comments:

Materials from the National Dairy Council such as "We All Like Milk" would be very valuable for use with this unit.

This unit may be easily adapted to the keeping of gerbils or other small animals.

The teacher may desire to divide this unit into smaller, more specific parts; for example, feeding the animals, sleep habits, play habits, etc.

Grade One

Submitted by Dorothy Ketchmark
Wendy Jacobson
Rosalie Drahos
Marguerite Hopkins

A STUDY OF THE SENSES

Behavioral Objectives:

1. The student will be able to name the five senses orally.
2. The student will be able to distinguish the senses by using charts.
3. The student will be able to use his senses in the experiments.
4. The student will be able to separate each sense during experiments with water forms.
5. The student will be able to tell about the senses as they relate to the experiments performed.
6. The student will be able to compare and describe the senses through dramatizations.
7. The student will identify and locate the senses on his person.
8. The student will discuss and label the senses he has used by pointing to each.
9. The student will be able to improve the uses of the senses by his own physical and mental activities in performing further self-directed experiments.

The Senses

Using the senses in discovering the qualities of water, ice, and vapor.

Objectives: What are the senses? What does the eye look like? How do we see? Do you have a blind spot? How are your eyes protected? Can you see better with two eyes or one? What does the ear look like? How do we hear? Why do we hear better with two ears? How do we smell odors? Can the sense of smell get tired or lost?

How do we taste things? How do we feel things? Are all areas of the skin equally sensitive to the touch? Evaluate what you learned.

Part I General activities for the Senses

First Activity

Discover parts of the eye and their jobs.

Directions to the teacher:

Have the students stand in front of a mirror in a brightly lighted room. Cover one eye with hand for 90 seconds.

Directions to the students:

Suddenly remove your hand and look in the mirror at the eye that was covered. What happened?

Materials: Mirrors

Comments:

The students could relate their experiences with the opening of the pupil to darkness, going from a theatre into the daylight. Let them formulate some of the safety rules concerning their eyes.

Second Activity Blind Spot

Directions to the teacher:

On a file card, place an X on one end and a dot on the other.

Directions to the students:

Close your left eye and hold the card before open right eye. Look at the X. Now move the card toward you and away from you. What happens?

Materials: 3X5 file cards or scraps of paper this size

Comments:

Let students try the experiment until the dot disappears completely. They could also try it with the dot. If they do not have success, tell them to put the card very close to their right eye and then take it away. Discuss what would happen if they were to lose one eye. What would be the handicaps?

Third Activity Do you see better with two eyes?

Directions to the teacher:

Place a table directly beneath a light. Stand approximately eight feet from a table.

Directions to the students:

Crouch down to table so your eyes are level with the table top and close one eye. Ask one of the other students to place a spool in the center of the table. Then ask him to place another spool (same size) either behind or in front of the first spool (don't tell him). Guess whether the spool is in front or behind. With both eyes try it again.

Materials: Table, two of the same size spools

Comments:

Was it easier or harder with one eye? with two eyes?

Fourth Activity Memory Eye Game

Directions to the teacher:

Let the students look at a number of objects, take one away, any object.

Directions to the students:

Determine which object was removed.

Materials: Any card game or set of differing objects.

Comments:

The students may want to extend this and make it into a "concentration" game making pairs and the one with the most pairs wins.

Make a large chart showing parts of the eye. Use a model of the eye. Discuss safety procedures where our eyes are concerned. Discuss the parts of the eye and their uses--lashes, pupils, tear ducts, lids. Let the students draw a picture of the eye putting in the parts they discussed. The Peabody Kit has many other excellent ideas to use when working with the eye.

Fifth Activity To discover parts of the ears and their jobs

Directions to the teacher:

Record different sounds on a recorder or let them listen to a record of sounds from the city or from the farm or the classroom.

Directions to the students:

Tell what you heard

Materials: Tape recorder or record player; tapes or records with desired sounds on them

Sixth Activity Who is Talking?

Directions to the teacher:

Select one child to talk while the rest are covering their eyes.

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Directions to the students:

Can you guess who is talking?

Comments:

Vary the game by blindfolding one student and having several students say the same word.

Seventh Activity Where is the sound coming from?

Directions to the teacher:

Have all the students get in a circle and choose one to be in the center. Either blindfold him or ask him to shut his eyes. Let one of the students make a noise and see if the one in the middle can turn to the direction of the sound.

Directions to the students:

Point to where you think the noise is coming from.

Materials: Scarf or cloth to be used as a blindfold; make sure the area is free of any objects so the student in the middle will not get hurt.

Comments:

Vary the intensity of the sounds and the quality. This will make some sounds very easy to locate while it will make others very difficult. Try to include in the experiment every student so each can draw his own conclusions. Make a chart that shows the parts of the ear, or get the delightful chart from the Sonotone Company--How We Hear. Begin with a simple chart and on to the more complicated one. Discuss the outer ear and its care.

Eighth Activity Do we hear better with one or two ears?

Directions to the teacher:

Put one student in a distant part of the room. Let the other students cover the one ear closest to the person who will do the clapping.

Directions to the students:

Cover your ear and close your eyes. One of us is going to clap. Point to where you think the clap is coming from.

Materials: None

Comments:

Repeat the activity as a person moves from place to place around the room. Repeat the activity and see if the score improves. Try the activity with both ears.

Ninth Activity   Smelling foods

Directions to the teacher:

Bring in various strong and weak smelling foods. Blindfold the students.

Directions to the students:

Try to include pungent odors--onions, garlic, delicate--strawberries, cake; fragrant--coffee, pie.

Tenth Activity Test for tiredness of the sense of smell

Directions to the teacher:

Have a very pungent odor in the room when the students come to school, like a freshly cut onion. Don't say too much about it. Later in the day ask them if they can still smell it.

Directions to the students:

Can you smell the odor now, is it as strong, why, why not? Have another child from another room come in and have him tell us what he smells.

Materials: Only the odor you wish

Comments:

Is the tiring of our sense of smell helpful? Why? Is it harmful? Why?

Eleventh Activity Test affecting smell in tasting

Directions to the teacher:

Have a student plug his nose and blindfold him. Have apples, onions, potatoes available.

Directions to the students:

Can you tell what you are tasting with your nose plugged and eyes blindfolded. So your senses work together?

Materials: Blindfold, swimming nose plug if desired, onion,
potato, and apple cut in chunks.

Comments:

Let the students discover why both senses are needed. Let them come up with the conclusions for why certain things cannot be tasted during a bad head cold. Have a "tasting" party. Test for sour, sweet, salty, bitter. Draw pictures of the tongue and show where certain foods are tasted. Use a tongue wall chart the students have helped to make.

Twelfth Activity What is it?

Directions to the teacher:

Place an object in a box. You might try ice first.

Directions to the students:

Feel to see if you can tell what it is.

Materials: Box and items desired to be touched.

Comments:

Try ice, grasses, food materials. Let the students make up their own "feely boxes" and pass them around the room.

Thirteenth Activity Mr. Five Senses

Directions to the teacher:

This is a culminating activity that can be done after the exploring of the senses.

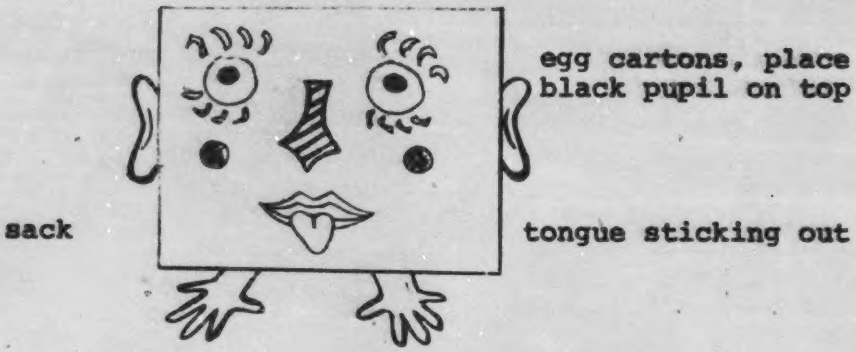
Directions to the students:

You will need scissors, paste or staples and crayons. The construction paper is for his ears, and hands and lips and tongue and nose. The black is for his eyelashes. The egg cartons will be used to make his eyes--the iris part. Each student will use his own paper sack.

Materials: Five different colors of construction paper, one for each of the senses, egg cartons cut up so each child can have one cone for each eye; scissors; crayons; paste; and a paper sack.

Comments;

Make the eyelashes by taking strips of black construction paper and curling them on a pencil before attaching to eyelid. Give him rosy cheeks with crayons and a tongue sticking out of his mouth. No certain nose or ears are required. Let the students be creative.



Fourteenth Activity

Use the Sense Puppets to make up poems or tell stories about their special sense. Mr. and Mrs. Smell, Mr. Touch, Mr. Taste, Mr. Look, Mr. Listen. See bibliography to see where they can be obtained.

Learn "sense" action poems:

Your Head Doesn't Move - Eye Exercise

Look up through your eyebrows
Look down through your toes
Look high in the corners
Look down past your nose
Go way 'round the room and back,
You travel with your eyes
Your head will never move at all
Now isn't that a surprise?
Now your trip is over,
Close your eyes to bed,
Relax and rest - - - -
Wake up, you sleepy head!
Blink, Blink, Blink, Blink!

Do Not Bump

The game is not to bump another,
Never touch or crowd the other.
This may be quite hard, I know,
But eyes will tell you where to go.
Use your eyes and find a space;
With hand outstretched to lead the way,
Tiptoe quickly there to stay.
But Never, Never, BUMP!

Mirror, Mirror on the Wall

Look in the mirror on the wall.
Stretch yourself and grow quite tall,
Drop yourself just like a clown,

Floppy, floppy, sad and frown.
Now breathe in and stand up tall
Hands on hips and don't be late.

Sizzling Hot

Reach down, slowly,
Pull up fast.
The floor is hot,
Your feet step fast.
Wherever you go it keeps getting hotter--
Hotter and hotter
You think you will melt--
Until the gong sounds
Until the gong sounds,
When you fizzle and--
MELT! (gong sounds)

Mirror, Mirror

I'm your mirror, look at me.
Do what I do right with me.
Stretch yourself and tiptoe light.
Clap your hands and stamp just right
Nod your head in answer, "Yes,"
Shake a "No" without a guess
Lift one shoulder, let it fall.
Lift the other and that is all.

Here We Go

Clap, clap, clap your hands,
Pat, pat, pat your legs,
Stamp, stamp, stamp your feet
Clap your hands, pat your legs,
Stamp your feet and Snap!

Fifteenth Activity

Make dot to dot number papers from the sense puppets for each sense.

Sixteenth Activity

Learn song about senses, "The Thank You Song" on an album by Kate Smith, Songs of the Now Generation, RCA LSP 4105.

Seventeenth Activity

Use the Audio-Visual materials on Practicing Good Health, Set No. 1, Kits 205, 206, 207, 208. See the separate heading under a. v. for specific titles.

Part II

Specific Activities for Studying Water In All Forms Through the Senses

Sense of sight in relationship to the liquid form of water.

Objectives:

Water as a liquid - No other substance appears in these three forms within earth's normal range of temperature. The molecules that make up water are always moving. The form it takes depends on how fast they move. No other common substance is liquid at ordinary temperatures between 32 degrees for freezing and 212 degrees or boiling point.

Vocabulary concerning water. Know what bodies of water are called - raindrops, lakes, oceans, seas, ponds, rivers and puddles. Bodies have arms and bodies of water have arms - rivers. What does liquid mean? A substance which takes the form of its container.

Abilities - surface tension, dissolving ability, capillarity.

First Activity

Directions to the teacher:

Place pictures of water about the room. Motivate discussion about bodies of water. Encourage discussion of clean water and polluted water. Encourage children to fill water glasses and add pollutants and food color. Discuss the looks of the water.

Materials:

Pictures of seas, oceans, rivers, puddles, raindrops, tears, glasses, rusty nails; food coloring; absorbent string; pan; twelve sugar cubes, two inch square piece of window screen.

Correlated Activities:

Science: Investigate surface tension of water. Place a square of window screen on the water. Is it floating or sinking? Why? Why not? Dissolving ability: Fill two

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water glasses the same amount in each. Dissolve twelve sugar cubes in one glass. Does the water change in any way? Does the level change? Does the taste? Capillarity: Put a piece of absorbent string into a pan of water. Let other end hang over the edge below the water's level. Where will the water go? Why? (The water should climb up the string and drip off the end.)

Music and Creative Play: Pretend that you are in a boat on a river. Imagine that you are a raindrop falling from a cloud--down, down, down...plop! You hit a tree, a car, a windshield and the wiper is smearing you back and forth. You are evaporating into the air again, oops you're a vapor!

"Rain Drops," Our First Music
"Crossing the Brook," The Kindergarten Book
"Stepping Stones,"Kindergarten Guidebook
"Boat Rhythm," This is Rhythm, Ella Jenkins

Social Studies: Discuss life on a sampan in China

Literature: Ping by Marjorie Flack

Art Activities: Draw a picture of rivers, lakes, and boats. Make a lake with people fishing, boating, swimming and skin diving. Paint a picture of a waterfall. Make a rainy day picture.

Numbers for Water as a Liquid: Find out how many cups of water it takes to water our plants. How much water we should drink each day?

Field trips: Local water department; fire station

Second Activity Liquid water - how does it taste?

Objective: Water has many tastes only because of what is in it.

Directions to the teacher:

Encourage discussion of water, tastes and the relationship of the source of the water to its taste. For example: ocean, deep well water, mineral well water (Saratoga, Thermopolis) shallow well water (hard water).

Directions to the students:

Taste hard water, soft water and tap water.

Materials: Salt, drinking cups for each student, distilled water and well water from Eco-Lab.

Comments:

Discuss how water will carry the taste of minerals and sometimes is polluted even when you can't see it.

Correlated activities:

Health: Boil water 20 minutes for purification, then filter it.

Third Activity Water and touch

Objectives: Water has a peculiar "feel." The chemicals in the water affect the "feel" of it.

Directions to the teacher:

Fill bowls with "hard" water, "soft" water and milk. Blindfold students and let them feel if there is a difference in the texture of the liquids. Dip hands in warm water then cold--if students need to use the restroom, discuss the reason.

Directions to the students:

After each experiment rinse hand under the faucet in room or in a pan of water from the school tap and dry hand before proceeding with next experiment.

Materials: Chemicals to produce the hard water, soft water, milk, three plastic containers to hold liquids so the students can easily insert their hands.

Correlated Activities

Language Arts: Describe how you would feel if you were a raindrop hitting the earth.

Science: Chemicals that make up hard water, soft water.

Health: Why do we go to the restroom when we suddenly immerse our hand in warm water - power of suggestion.

Fourth Activity Water that you smell

Objectives:

Water carries the additive which we smell. Water has no odor. When animals smell water, their sensitive nostrils feel the moisture in the air. Or they smell the leaves or vegetation which grows around the water. Terms: saline and alkaline.

Directions to the teacher:

Encourage students to smell salty water, sugar water and fishy water. Discuss the fresh smell after the rain.

Directions to the students:

Smell water after you mix salt in it, sugar in it and fish in it.

Materials: Fish (form there of); salt; and three sugar bowls

Comments:

Language: Poem - After the Rain

Fifth Activity Liquid water and hearing

Objectives:

Water in a lake does make noise when assisted by the wind. Water in a stream makes noise when assisted by gravity and slopes. Water in a prairie river has a gentle slope and is quieter. Heat will make water audible. Water under pressure will make noise upon release (sprinkler).

Directions to the teacher:

Stimulate as many water noises as possible in the classroom.

Directions to the students:

Pour water over a steep slope with rocks to splash over (aluminum foil trough on a board covered with coarse gravel). Lower board to almost level position and pour water into higher end and listen for movement. Compare the two sounds.

See movie "Wild Shores", Union Pacific R.R. Film for ocean noises. Perk a pot of coffee--boil a pan of water, use pot with no percolator.

Materials: Coffee, coffee pot, hot plate, four inch board, five inch piece of aluminum and approximately six pounds of rocks one inch and two inches in diameter.

Comments:

Science: Study gravity and erosion by water.

Social studies: Life in mountains with noisy streams. on the plains with quiet rivers; on the coast of an ocean.

Language: Poem from This is Rhythm by Ella Jenkins.

Health: Why milk is better for children than coffee. "You may drink coffee when you grow up, but now only milk should fill your cup."

Sixth Activity Water pollution experiment

Objective: To show how water can become polluted.

Directions to the teacher:

Two days before the experiment fill a glass with water. Leave cover off and let stand on a shelf or counter. (At the end of day, add a little water if necessary to insure there is enough liquid in the glass on the day of the experiment.)

On experiment day, fill a glass with water and to another glass add sweepings from the floor and do add grease or oil from the janitor's supplies. Add clear water and mix. Take the three glasses of water and discuss the pollution possibilities of each. Do not forget the smelly condition of the room on occasion during the period the water stood in the room.

Directions to the students:

Insert pipe cleaner into each container and examine it. Put a drop of water from each onto a slide and examine under a microscope.

Materials: Three glasses, pipe cleaners, slides, and microscope.

Comments:

Will the "stale" water look different? Is it polluted?

Seventh Activity Senses in relation to water as a vapor

Objectives:

To demonstrate that vapors may or may not be seen.
To demonstrate that vapors will feel some ways.
To demonstrate that vapors will have a taste.
To demonstrate that vapors will have odors.
To demonstrate that vapors can be heard.
To demonstrate condensation.
To demonstrate that vapors take up space.

Directions to the teacher:

Create steam by boiling water. Create clouds. Have the students breathe into a glass while outside in the cold air. Have the students observe car exhaust to see a "cloud." (water that has turned into a vapor)

Directions to the students:

Try to find out where the steam is coming from. What are clouds made of? What happened when you breathed into a glass when you were outside in the cold air? Why do we see a cloud when a car is started on a cold morning?

Materials: Hot plate, tea kettle or pan to make rain, cake pan, and glasses.

Comments:

Health: Where does steam come from? Is it very hot? What can it do to you? Why?
Music: Clouds - Sing on Our Way, Ginn, Grade 1
Language arts: Roberts English, Book 1, p. 104 "Clouds."

Eighth Activity

Directions to the teacher:

Creating vapors that can be seen: Blow up balloons and begin small and blow till it becomes larger and larger until perhaps it bursts.

The balloon becomes larger showing that air does take up space. If the balloon bursts, it also shows that the balloon had no space left which the air could be put.

Directions to the students:

What will happen if we blow up a balloon? What will be inside the balloon? Why will it change? What will make it change? What might happen if we keep on blowing?

Materials: Balloons for all students.

Comments:

Science: Discuss what makes some of the balloons we get at a circus or store stay in the air.

Language arts: Make up a poem about balloons and write it on a large tablet as an experience chart or record it.

Ninth Activity

Directions to the teacher:

Can you taste steam? Experiment by letting the students distinguish between foods cooking. Try an onion, chocolate milk, lemon, a smoked meat.

Cook foods in a pan of water, excepting the milk. Where does the steam come from? Can you really taste it or are you smelling it?

Directions to the students:

Where does the steam come from? Can you smell something salty? bitter? sweet? in any of the steaming dishes?

Materials: As many pans as foods to be heated, hot plate.

Comments:

Health: Discuss why you shouldn't get too close to the steam. Discuss why it burns even though it is not harmful looking.

Music or creative play: Do the song "I'm a Little Tea Pot." Emphasize the part about "steamed up." Perhaps culminate with a taste of tea.

Tenth Activity

Directions to the teacher:

Clouds, can you taste them? Make rain as directed in Number 1 again this time letting the students try to detect an odor.

Directions to the students:

Can you smell anything in this vapor? Why? How could you make it have an odor, what could you add? Can you really taste it with your tongue?

Comments:

Personal experiences: Draw from the students whether they have been in a thick fog and have had an opportunity to really open their mouths and "taste" the fog. Also, if there is such a foggy day this year, take time to experience it and determine whether fog can be tasted.

Health: This would also be an appropriate time to bring up car exhaust and why it is not healthy for us to inhale it. Also pollution problems with cars could be discussed.

Literature: Mike Mulligan and His Steam Shovel, by Robert McLuskey.

Poem: "One Misty Morning", p. 50, Roberts English Book 1.

Eleventh Activity

Directions to the teacher:

Can a vapor sizzle, crunch or boil? Perform experiments to determine if you can hear steam; boiling water in a tea kettle, radiator--both whistle from the steam escaping.

Directions to the Students:

Can you hear boiling water? Can you hear clouds? Can you hear your breath? Can you hear water disappear? Would a vapor crunch? Give an example or do an experiment.

Materials: Tea kettle that will whistle

Comments:

Might take a field trip to see radiators working

Physical Ed.: Pretend you are popcorn sizzling in oil and beginning to pop.

Health: Radiators - explain that they should not be touched. Then have the students come up with reasons.

Language: See the Peabody Kit, level 2 for more ideas.

Twelfth Activity

Directions to the teacher:

Smelling odors in vapors. When will steam have an odor? Perform the cloud experiment in Number 1 again to see if the students can detect an odor from the clouds. Do our breaths have an odor? Why? Can you smell water evaporating? Add spices to boiling water. Eat vegetables, chocolate.

Directions to the students:

Can you tell if boiling water or steam has an odor? Why? When will the steam have an odor? Would a cloud have an odor? Why? Why not? Can you tell what someone has eaten by his breath?

Materials: Tea kettle, spices to add to the water, onions. pickles, chocolate and oranges for tasting.

Comments:

Science: Include the different ways to discriminate between odors: pungent-onion or wood smoke, delicate - strawbeery or cake, fragrant-coffee, fruit pie. Have a blindfold test to see if students discriminate beween the odors.

Health: When do we use a vapor to help us? When we have a cold, sometimes we use a vaporizer. What do we put in the vaporizer? What might be some safety precautions to use with a vaporizer?

Language: Is it fun to smell? Make up a story telling about the thing you most like to smell and why.

Thirteenth Activity

Directions to the teacher:

Vapors and touch: How will steam feel? How will clouds feel? How does your breath feel? How does it feel to have water evaporate from your body?

Directions to the students:

If you were to touch steam, how would it feel? warm? hot? cool? cold? How does it feel to stick your hand outside on a cloudy, foggy day. How does your breath feel to you, blow on your hand. Wet your hand and let it dry without wiping it with a paper towel. Can steam, clouds, breath, and water evaporation feel smooth, rough or hard. Why? Why not?

Materials: Water

Comments:

Creative drama: What would you feel like if your were a cloud on a cold morning? If you were steam coming out of a tea kettle? If you were someone's breath coming out of their body on a cold day or on a hot day. How would you show water evaporating into the air?

Music: "Steam Shovel Song", Our First Music, Sammy Richard, p. 197.

Field trip: Visit the Big Boy engine in Holiday Park. Find out what the engine ran on (steam) and compare it with the engines now. Do the diesel engines cause more pollution? Did the steam engines cause pollution? Why did the railroad stop using the Big Boy?

Music and creative drama: "I'm a Little Engine on the Track," Sing and Do Album I, available from music office.

Health: Can you feel the dampness of water when you are outside when it is cold? When does it make you feel colder? Discuss dressing for the weather. Do you feel warmer or colder when the air is moist? Why?

Creative Drama: Pretend you are a water vapor in a rainbow.

Personal Experiences: Have you ever taken a steam bath or has anyone in your family taken a sauna? Interview them and tell the class about it. Have you ever been to Saratoga and seen the hot springs? Or have you been to Yellowstone National Park to see the geysers? What comes out of the geysers? Is it warm, hot, etc. to the touch? What do they have built so you can see the geysers? Should you get off the walks?

Fourteenth Activity Water as a solid form

Objectives: To observe ice with the five senses: Smell, Sight, Touch, Taste, and Ears.

Directions to the teacher:

Let the student discover with senses. Students should get cubes of ice and record with drawings of them.

Directions to the students:

Use your senses and discover things about ice.

Materials: Plain ice, sugar ice, salt ice, Kool-aid ice and polluted ice.

Comments:

Questions to ask with each sense with previous materials.

Taste: What kind of things do you taste? What feelings do you receive. What are the differences if any between the different ices?

Smell: What do you smell? Do you smell differences with the different ices? What should ice smell like?

Sight: What do you see? What has happened while you were watching? How do your eyes feel near the ice? Are there differences in the ices?

Touch: What happens when you touch it? What happens to your fingers? Would you like to sleep on it? Why? Is it like anything else you felt?

Hearing: What do you hear? Do you hear differences between different cubes?

Social studies: Study Ice Age; possible theme: Can it happen again? Question: "What would it be like?" possible uses of ices; where do we get it, from whom, when, where?

Art: Ice palaces, ice carving, ice models out of different medias.

Language arts: Poems about ice (create them); stories about ice.

Physical education: go skating, figure or hockey.

Math: Measure ice and once it turns to water.

Safety: What happens when you put ice on your tongue or hand? Ice and electricity: Are they dangerous?

Reference materials:

Audio-visual materials:

Practicing Good Health (Set No. 1) filmstrip with accompanying record (made by Walt Disney and Jimmney Cricket--Excellent aides)
Kit 205 You and Your Ears and Eyes
Kit 206 You, the Human Animal Living Machine
Kit 207 You and Your Sense of Touch
You and Your Sense of Smell

Kit 208 You and Your Five Senses
You and Your Food

Filmstrip

We Learn About Weather	SE FSSC1
Plants and the Things We Use	SE FSC4
Adventures in Seeing	FSL42
Taste, Smell and Touch	FS1146
Life in the Polar Regions	SE FSC11

Models

Eye and Ear	Kit 68
Eye and Heart	Kit 176
Ear	Kit 177

Charts

Sonotone - Chart on How We Hear

Puppets

Face puppets of the five senses, Tiny Tots Publishing House, 5483 No. Norwest Highway, Chicago, Ill 60630

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Brennan, Matthew, ed. People and Their Environment, Teachers' Curriculum Guide to Conservation Education, J.G.Ferguson Publishing Company, Chicago, Ill., 1968.

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Cultice, Wendell W., Field Trip and How to Make Your School Get the Most of Them, Prentice Hall, Englewood Cliffs, N.J., 1967.

Efron, Alexander, Light, Rider Col, New York, 1958

Gaeddert, Lou Ann, Noisy, Narcy Norris, Doubleday and Co. Inc., Garden City, New York, 1965.

Geralton, James, The Story of Sound, Harcourt, Brace and World, Inc., New York, 1948.

KOLab, Kemmerer Outdoor Lab, School District #1, Kemmerer, Wyoming

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Le Seig, Theo, The Eye Book, Random House Inc. New York (all the other bright and early books)

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Windle, Eric, Sounds You Cannot Hear, Prentice-Hall Inc., Englewood Cliffs, N.J., 1963.

Wise, Margaret, The Noisy Book, Harper and Row, New York, 1937.

Zim, Herbert S. Lightning and Thunder, William Morrow and Co., Inc., New York, 1952.

Encyclopedia References:

Britannica Junior. Editors of the Encyclopaedia Britannica, Walter ust, Ear, Chicago: Encyclopaedia Britannica, Inc., 1960, Vol. 5, 205-6.

Compton's Pictured Encyclopedia and Fact Index, Guy Stanton Ford, Ed. The Ear, Chicago: F.E. Compton and Co., 1961, Vol 4, 214-15.

Our Wonderful World. Grolier Incorporated, Herbert Zim, Ed. The Senses, New York; Grolier Inc., Spencer Press, Inc., 1963. Vol. 4 and 14.

World Book Encyclopedia. David C. Whitnew, Ed. Ear, Chicago: Field Enterprises Educational Corporation. 1962. Vol. 5.

Poems and drawings to go with ice unit:

Ear, ear, what do you hear?

Touch, touch
it's cold too much

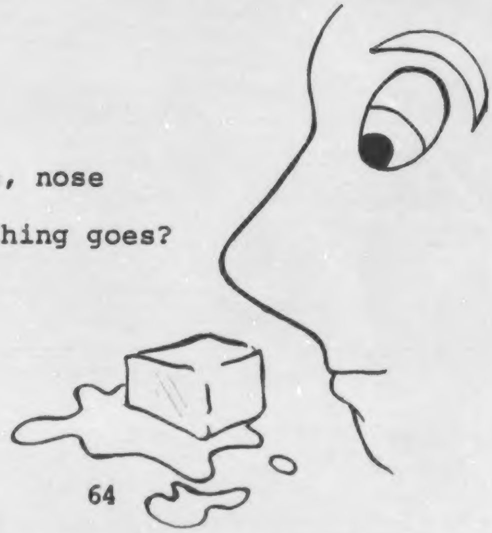
Water--Ice--Taste

Taste, taste   do it in
haste

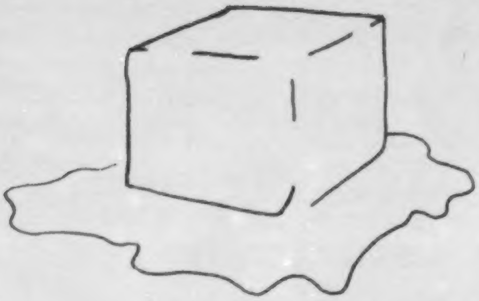
Eyes, eyes, is there
ice in the skies?

Nose, nose

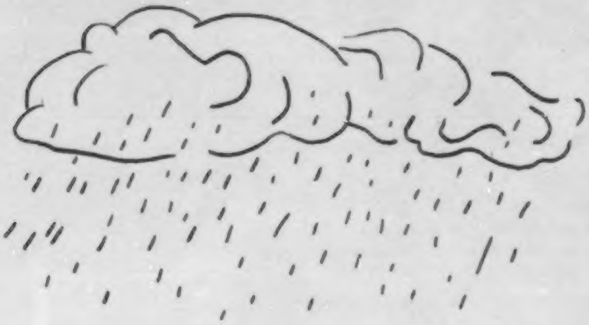
Anything goes?



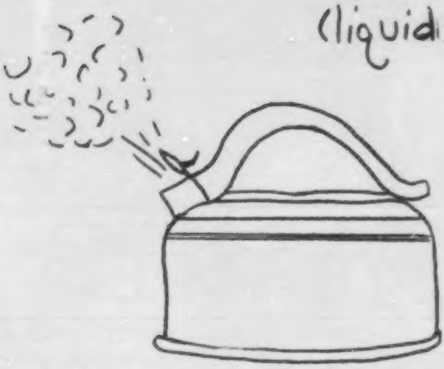
Forms of Water



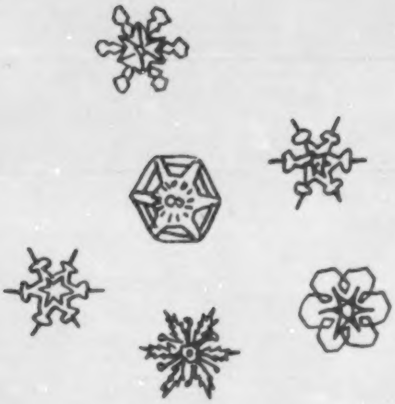
Ice
(solid)



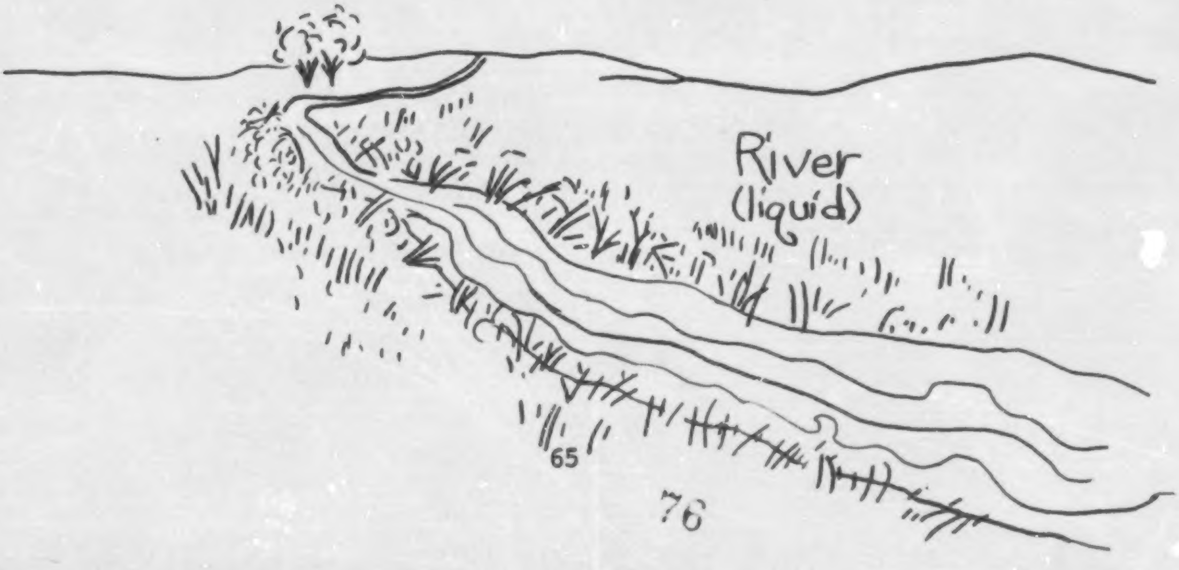
Rain
(liquid)



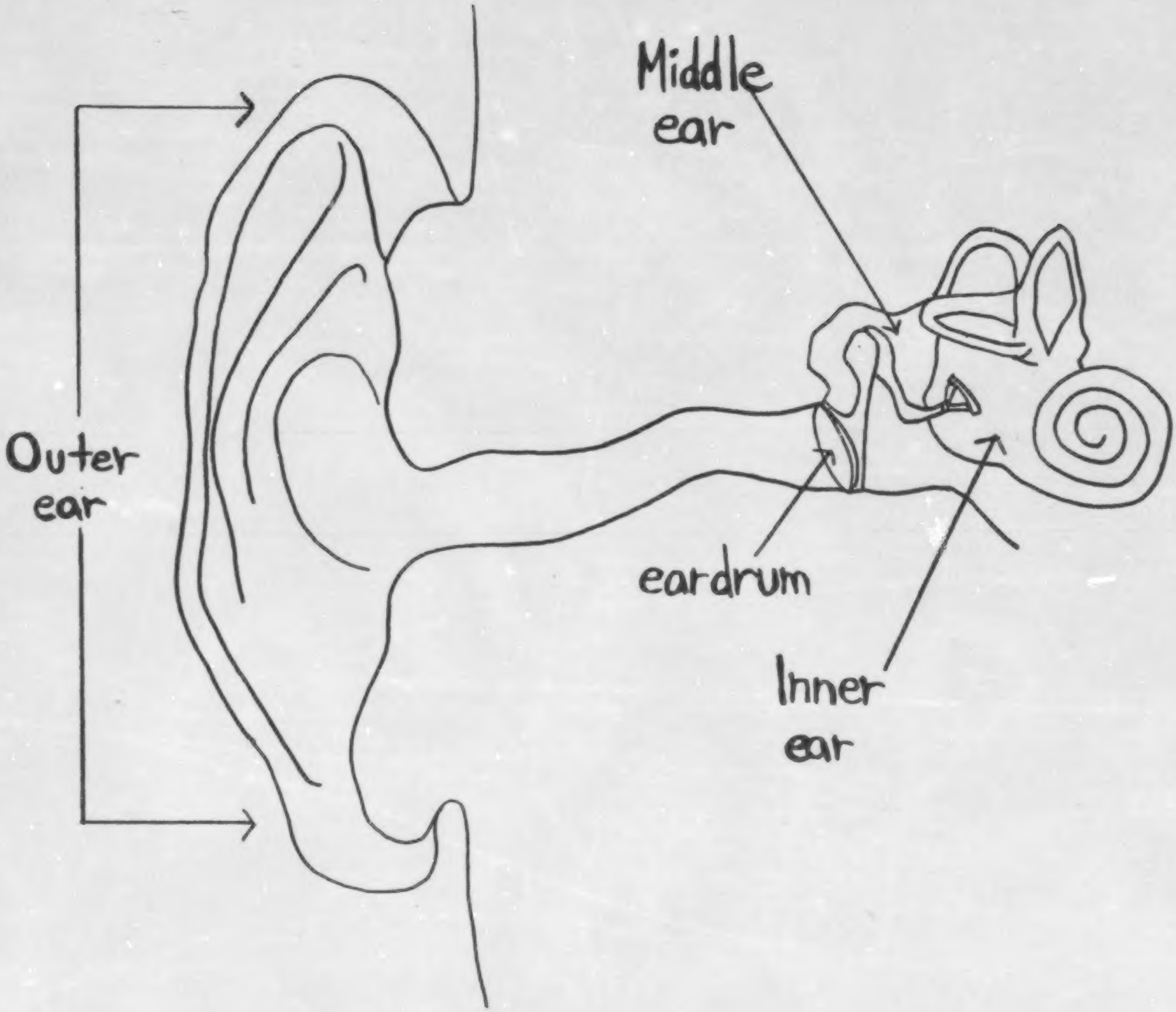
Steam
(gas)



Snow
(solid)

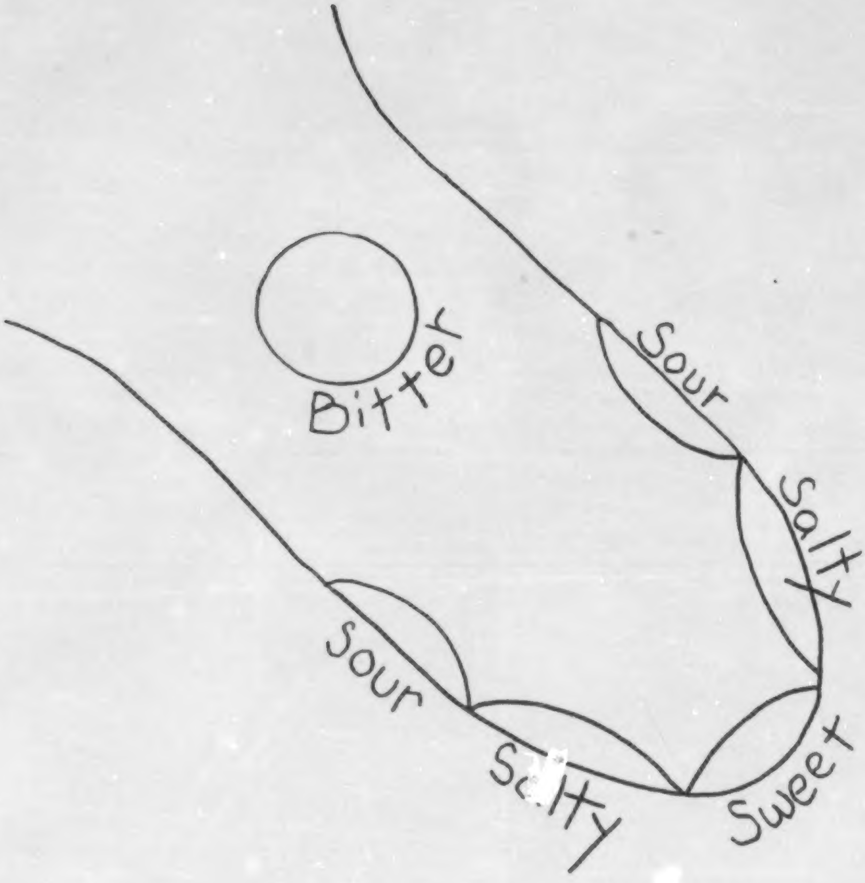


River
(liquid)


Middle ear
Outer ear
eardrum
Inner ear

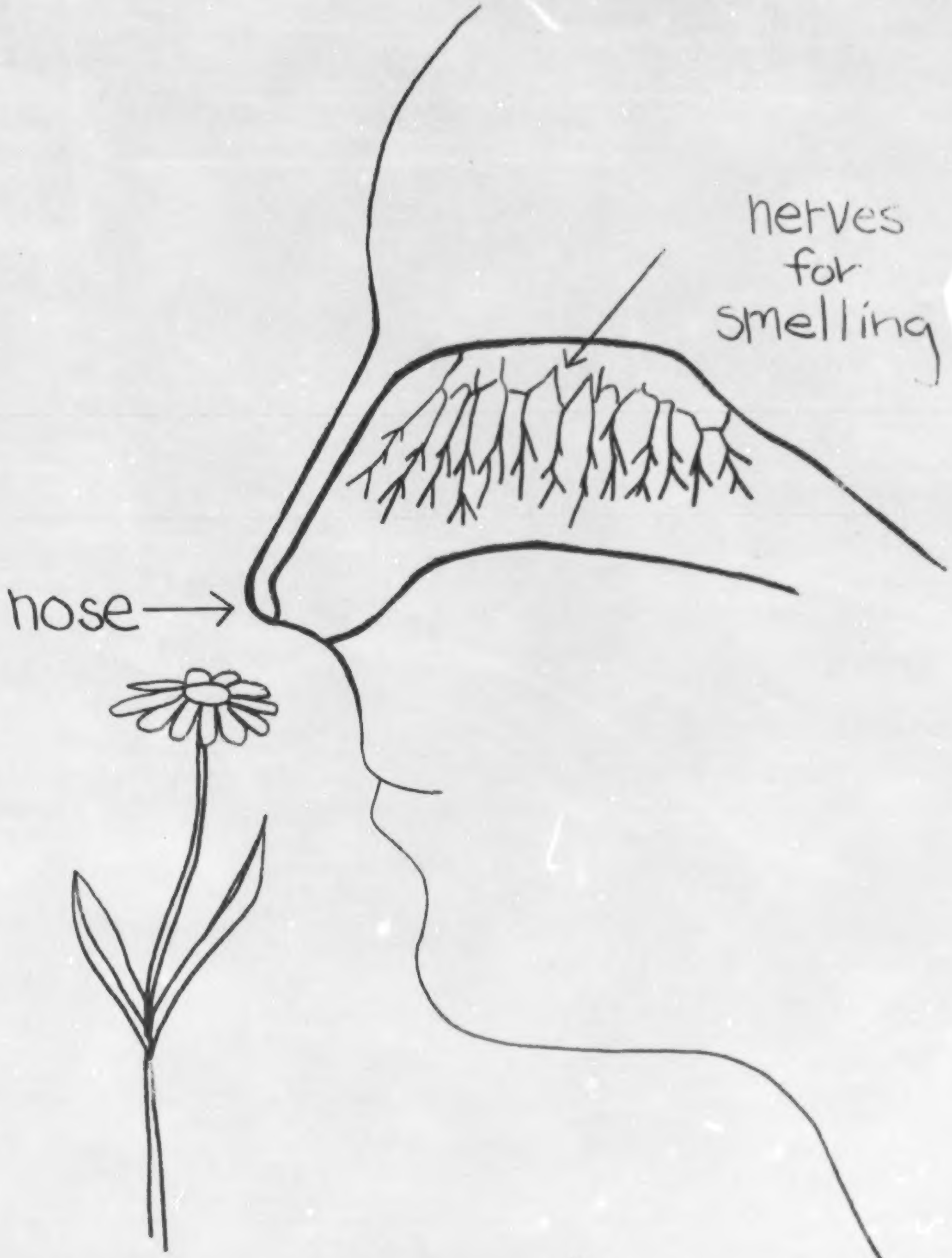
HEARING

TASTE

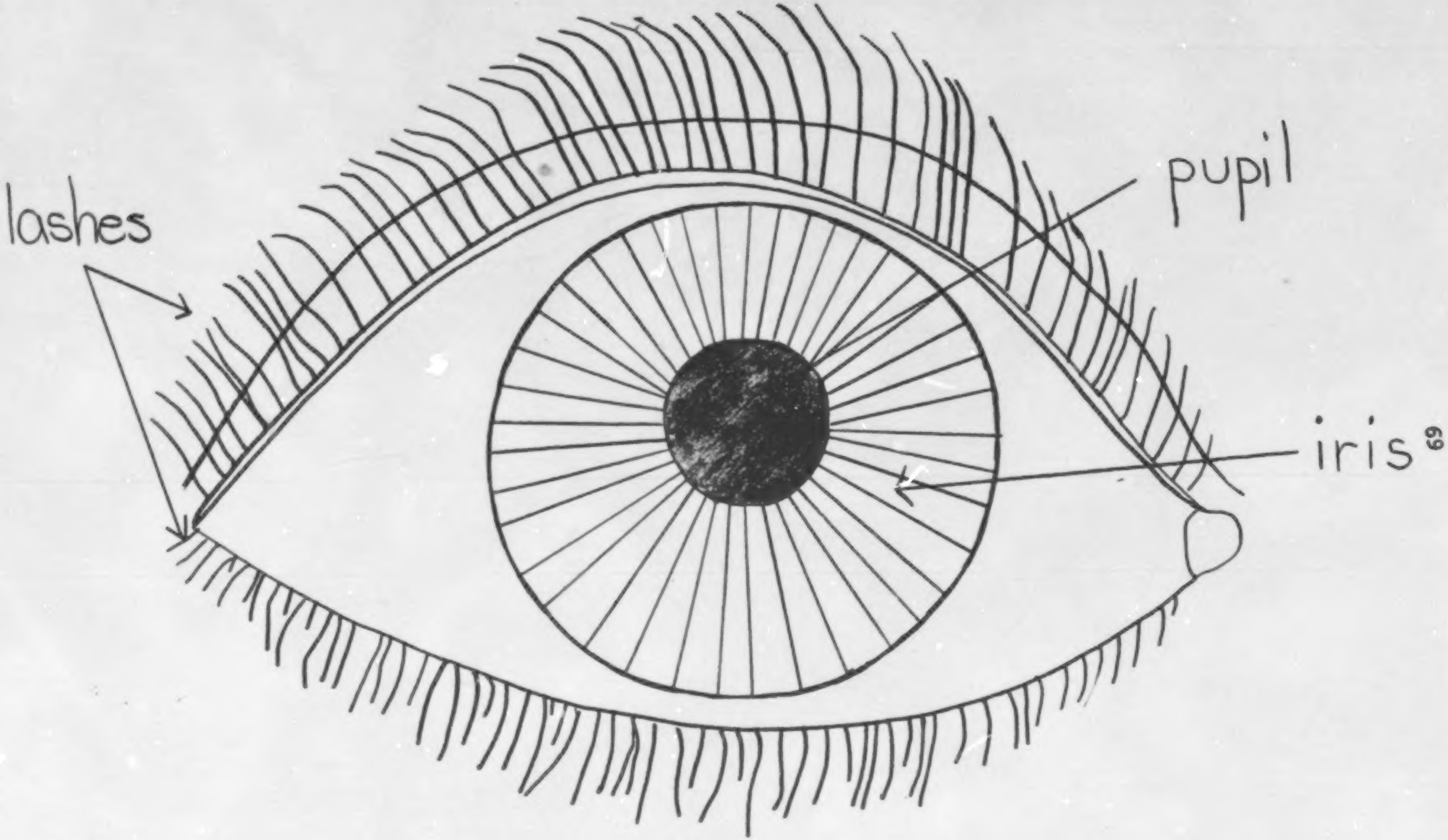

Bitter
Sour
Salty
Sour
Salty
Sweet

a taste map of the tongue

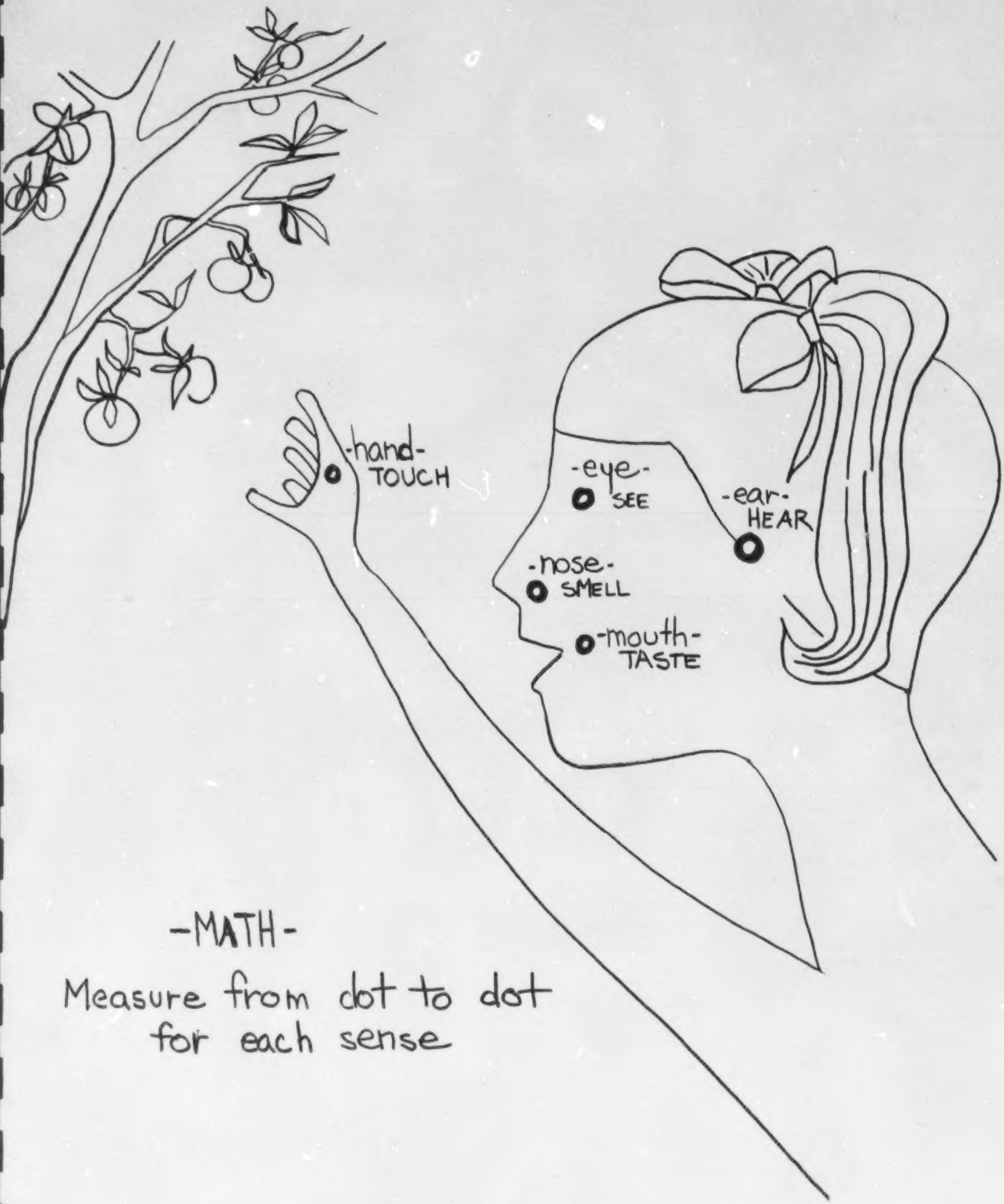
SMELL


nerves
for
smelling
nose

SIGHT

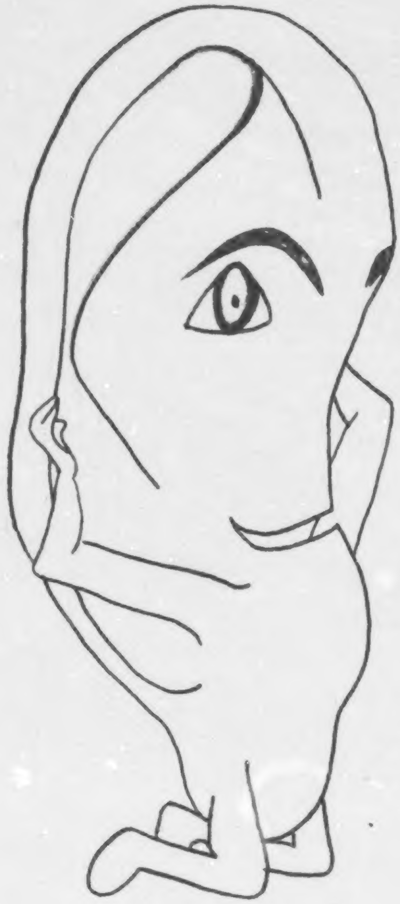

lashes
pupil
iris
69

-the eye-


-hand-
TOUCH
-eye-
SEE
-ear-
HEAR
-nose-
SMELL
-mouth-
TASTE

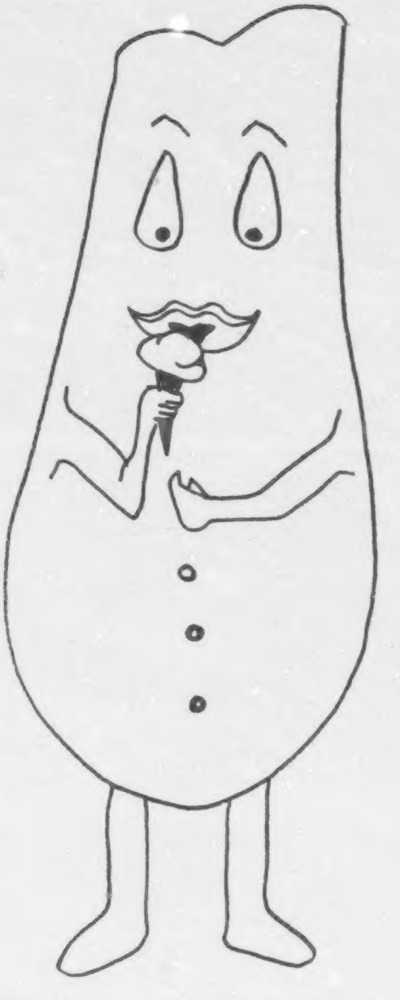
-MATH-

Measure from dot to dot for each sense

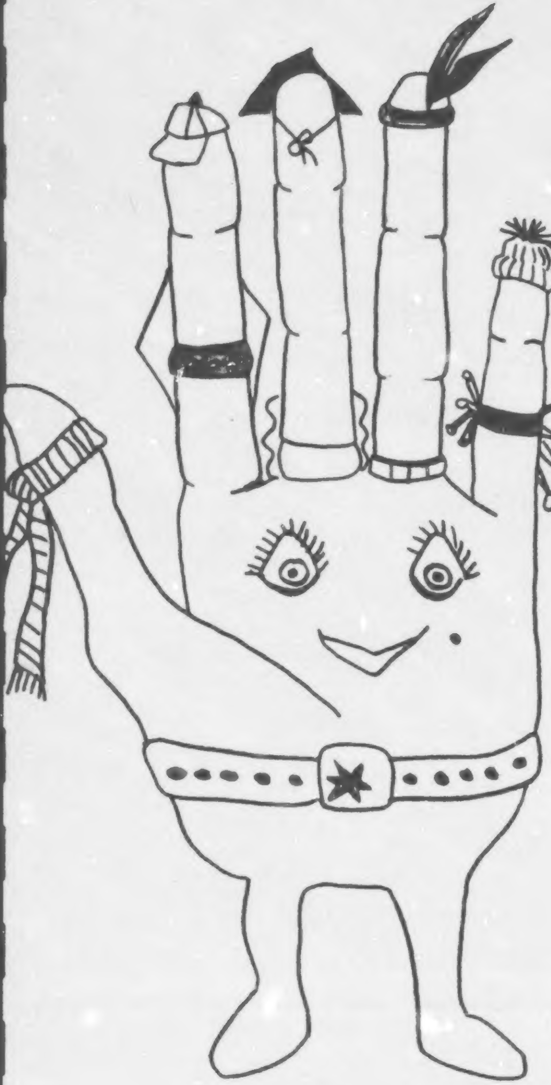


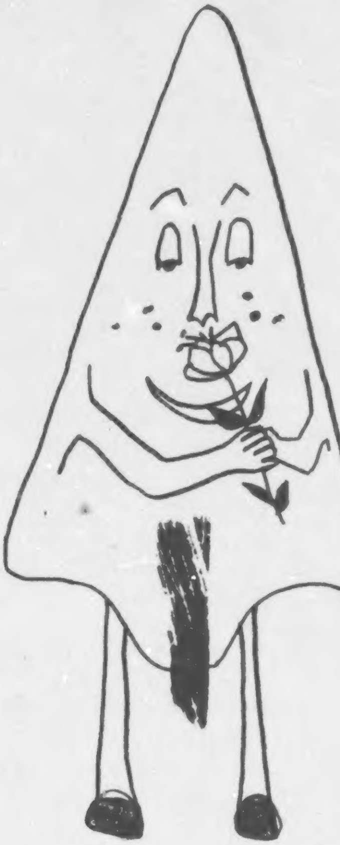
Mr. Listen
-EAR-

Mr. Taste
-TONGUE-



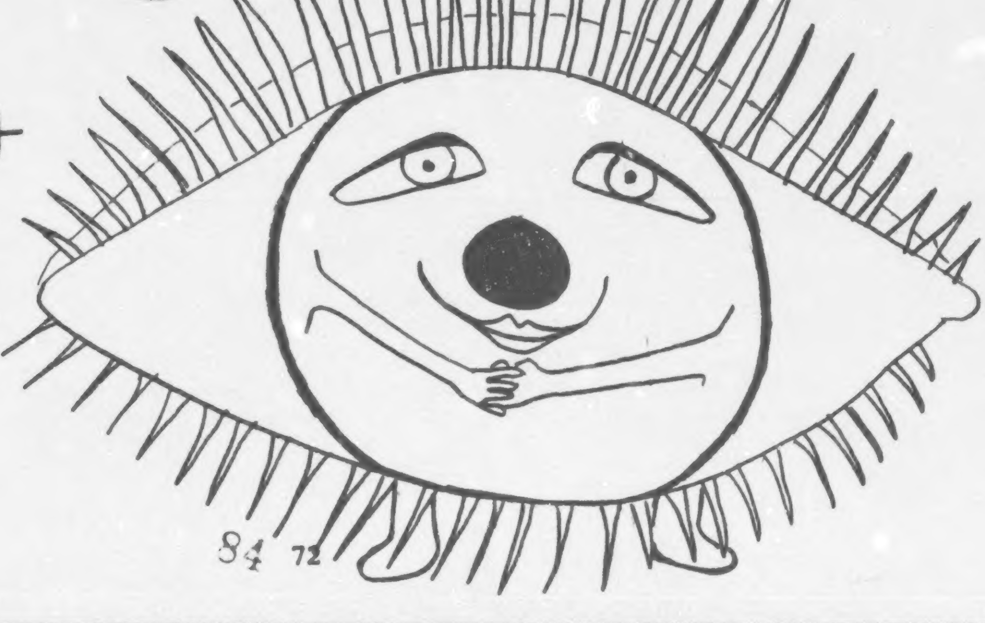
Mrs. Touch
-HAND-





Mr. Smell
-NOSE-

Miss Sight
-EYE-



Grade Two Submitted by Mary Jones

ENVIRONMENTAL HABITAT OF FIVE INSECTS

Behavioral Objectives

1. The student will be able to identify the term "insect" by noting at least three special characteristics of insects.
2. The student will be able to distinguish an insect from a non-insect.
3. The student will be able to demonstrate two ways in which an insect protects itself.
4. The student will be able to show the three parts of an insect's body.
5. The student will be able to explain the stages of development of an insect.
6. The student will be able to compare insect houses and community life with human homes and community life in at least one way in which life is similar and one way in which it is different.
7. The student should be able to voluntarily search for and bring to class an insect.
8. The student should be able to make a model of an insect.

First Activity:

Directions to the teacher:

Take a "detective trip" out on the school grounds and discover as many insects as possible. Make an insect collection of the five insects--fly, grasshopper, bee, mosquito, and ant. Make an insect trap and place several around the school grounds.

Make a display board of insect survival. Study insect homes--collect a wasp nest, make an ant colony, acquire a bee comb. Study how the weather affects insects--place jars of house-fly maggots in hot, cold, and warm places. Make a room library of insect books. Show pertinent films and filmstrips.

Directions to the students:

Take collection nets and collection jars and find as many bugs as possible on the school playground. Upon returning to the classroom, inspect the bugs to determine which are really insects. Keep the flies, grasshoppers, bees, ants, and mosquitoes. Take several jars or cans, place a piece of food inside, and bury it up to the rim in different places around the playground.

Collect pictures for the survival board showing how the bee stings, some insects run and hide, some use camouflage. Collect insect homes--wasp nests, make an ant colony, etc. Keep a time chart of the maggots in the hot, cold, and warm places. Inspect them regularly. Write a story and draw a picture about an insect.

Materials:

Collecting net for field trips around school playground. (Make a net with nylon stocking put over a stretched wire hanger.) Insect traps: jars, coffee cans, etc., small pieces of food for bait. Insect cage: two pie plates, screen rolled into cylinder.

Plaster of paris, small stick, display boxes, kill jar and pinning block and pins, glass jars for rearing flies, small jar cap filled with bran and sugar.

Concepts to be developed:

Insects contribute to a balance in nature. The insect, or arthropod, have no internal skeleton. Their body wall is made up of a tough material called chitin. The body cavity is filled with fluids which are circulated by a pumping organ called a heart. Jointed legs are a major distinguishing feature and insects have three pairs.

The insect body is composed of three parts: the head, the thorax, and the abdomen. The insect goes through three or four stages in development, called metamorphosis. The head has two antenna with compound eyes and usually two pairs of wings. Living insects need water, air, food and a place to live. Insects are numerous and some are helpers and some are villians.

Instruction Materials:

Books for students:
Butterflies and Moths by Harry Zarchy
Monarch Butterfly by Marion W. Marcher
Green Darner - The Story of a Dragonfly by Robert McClung
Doubleday First Guide to Insects by Susan Swain
Luna - The Story of a Moth by Robert M. McClung
A Maxton Book About Insects by Sy Barlowe
The True Book About Insects by Illa Podendorf
Follett Beginning Science Book - Insects by Jeanne Brouilette
Ladybug by Robert M. McClung
Crickets by Olive Earle
The True Book of Honeybees by John Lewellen

Books for teachers:
Doubleday First Guide to Insects, Zan Moguchi Swain, 1964.
Insects, (Golden Nature Guide), Simon and Schuster, N.Y.
Insects, R. M. Baranowski, 1964.
Insects in our Works, R.C. Shenefelt, (Whitman), 1964.

Films, Filmstrips and Kits

Tropical Butterflies	Kit 21G
Zoology D - Insects	Kit 60
The Caterpillar's Journey	FS 1I84
The Insects	PS 87
Combatting Insect Pests	FS 1A14
Learning About Insects	SE FS S3
Aesop's Fables: The Grasshopper and the Ant	SE Kit I

Second Activity: The Honey Bee

Directions to the teacher:

Make a bee stencil showing the stages of development. Have a display board of pertinent bee pictures. Show film and filmstrips and read background information about the bee. Make slides of legs, wings, head and stinger of bee for microscope.

Collect a bee comb for observation table. Invite a community bee keeper to lecture. Take a field trip and at a safe distance observe the bee going from flower to flower. Have a honey tasting party.

Directions to the students:

Color the bee stencil - the larvae and pupae are cream colored - the bee yellowish brown or black. Collect bee pictures and read the library books. Examine the slides of bee parts under the microscope. Draw a bee comb and write a story about bees living and working in a hive.

Materials:

Paper for stencils and pictures, bee comb, glass slides and covers, microscopes and honey and crackers.

Concepts to be developed:

Honey bees are social insects. They are helpful insects and have the job of pollinating our food crops. The honey bee will gather nectar and pollen from only one type of blossom on one flight. This is important to plants that are self-sterile and must be cross-pollinated. Not all bees have stingers. Only the queen bee lays eggs. Most eggs develop into working bees. The hive is sealed during the winter months. Honey is stored for winter eating.

Materials:

The Bees	Kit 210
Honeybees	FS C45
Honeybees	PS 15

Bee Hind Leg	Kit 114
Bees, Honey	PS 15
Secrets of the Bee World	MP 249

Third Activity: The Ant

Directions to the Teacher:

Make a worker ant stencil, listing the different parts of the adult and showing the stages of development. Display pictures of ants and their activities. Show film and filmstrips for background information. Make slides of different parts of the ant.

Make an ant nest in a jar for classroom display table. Take a field trip to observe an ant colony.

Directions to the students:

Color the ant stencil - the larvae or pupae cases can be made cream yellow and the ant black or red. Collect pictures and look up information about the ant. Examine the slides of the ant parts under the microscope. Make an ant colony.

Materials:

Paper for stencils and pictures; quart jar with soil for ant nest; dark paper for the sides of the jar; bottle cap with honey and water for food; dug up ant nest; (leave covered for a few days for ants to make tunnels); slides of ant parts; microscopes; and magnifying glasses.

Concepts to be developed:

Ants live everywhere. Ants are soil conditioners and eat harmful insects. Each colony has its own odor. The ant is one of the strongest of insects.

Instruction Materials:

The Ants	Kit 21M
Ant Antenna	Kit 11A
Army Ants	MP 443
Secrets of the Ants and Insects	MP 250

Fourth Activity: The House Fly

Directions to the teacher:

Make a fly stencil showing the stages of development. Show film and filmstrips of pertinent information. Make slides of the parts of the fly. Take a field trip around the playground to observe possible fly breeding places.

Directions to the students:

Color the fly stencil - the larvae or maggots can be colored cream yellow and the pupae cases reddish brown. Write a creative story about the house fly. Ovserve the fly parts with microscope.

Materials:

Paper for stencils and stories. Glass slides and covers. Microscopes and magnifying glasses.

Concepts to be developed.

The house fly is a scavenger and carries filth; it increases in numbers very rapidly; the head has two large compound eyes; the foot is made so it can walk upside down on the ceiling; and the best way to control the housefly is to clean up its breeding places.

Instructional Materials:

Fly Leg	Kit 114
Fly Compound Eyes	Kit 114
Fly Wings	Kit 114

Fifth Activity: The Mosquito

Directions to the teacher:

Make a stencil of the adult mosquito and its stages of development. Show film and filmstrips pertinent to the mosquito. Make slides of the parts of the mosquito. Take a field trip to observe possible breeding places.

Directions to the students:

Color the egg rafts cream yellow, and the larva and pupae a brownish gray. Observe the mosquite parts with a microscope. Tell what you can do to help control the mosquito.

Materials:

Paper for stencils, glass slides and covers, microscopes and magnifying glasses.

Concepts to be developed:

The mosquito is a close relative of the house fly. One kind is responsible for spreading diseases such as malaria. The mosquito has a long sharp sucking mouth and feeds entirely on animal blood.

Instructional Materials:

Mosquito Mouth Part	Kit 114
Mosquito Larvae	Kit 114

Sixth Activity: The Grasshopper

Directions to the teacher:

Make a grasshopper stencil and identify the different body parts. Show film and filmstrips of pertinent information. Collect grasshoppers and keep in an insect cage for observation.

Invite a Department of Agriculture specialist to discuss the job of controlling the grasshopper. Take a field trip to observe the possible destruction of the grasshopper.

Directions to the students:

Color and identify the two groups of grasshoppers. Observe the grasshoppers on the display table. Write a story from information you collect about the grasshopper.

Materials:

Paper for stencils and stories; insect cage for display table.

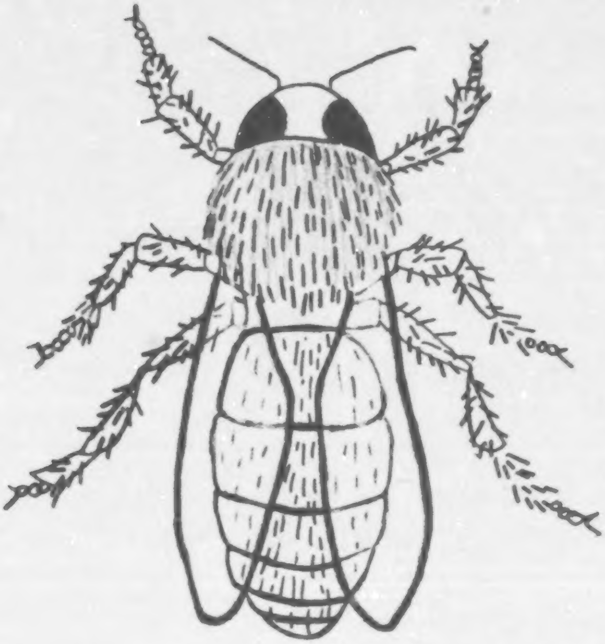
Concepts to be developed:

Grasshoppers are divided into the long-horned and the short-horned. Young grasshoppers are wingless. They have strong jaws and feed on plants.

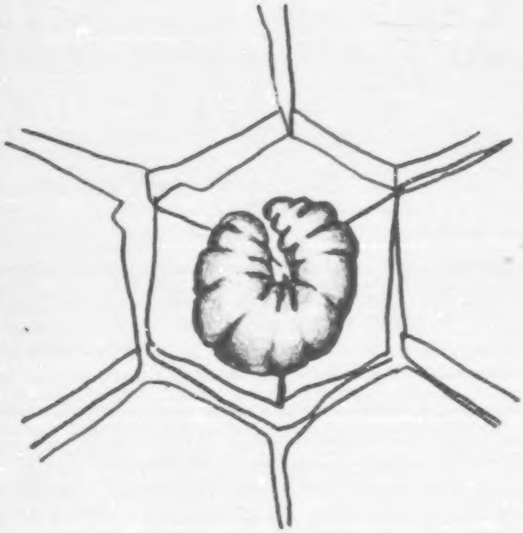
Instructional Materials:

The Grasshopper: Internal and External   TR 78

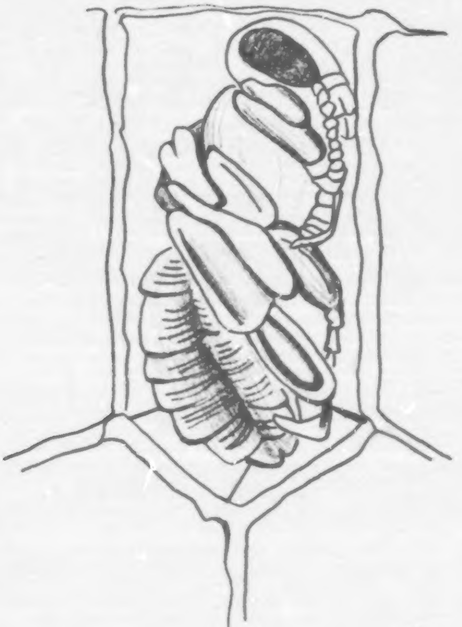
HONEY BEE



adult
(worker)

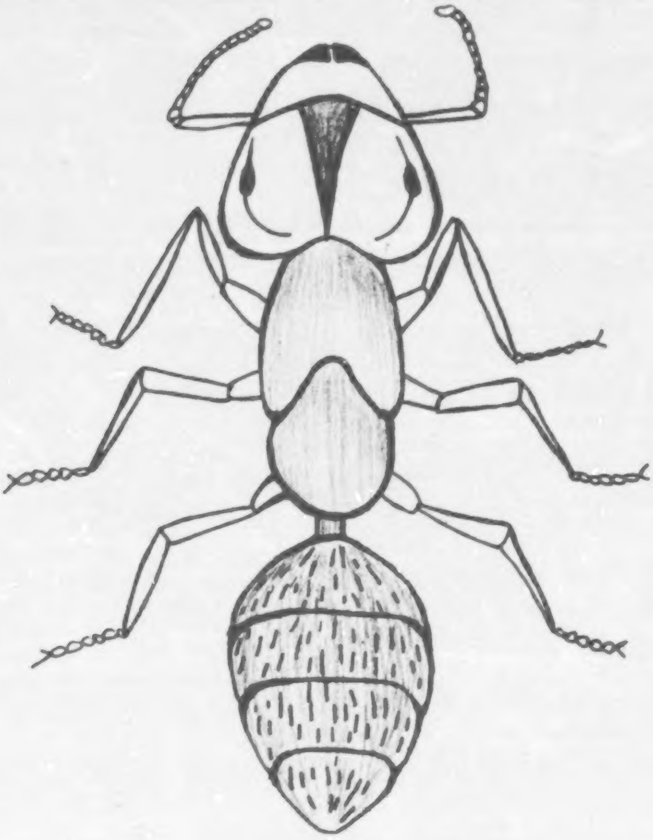


larva in comb
cell
(top view)

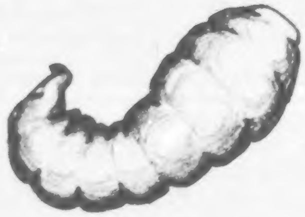


pupa in comb
cell
(side view)

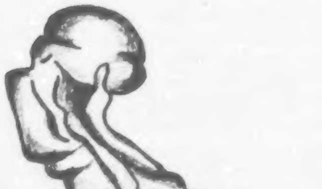
CARPENTER ANT



adult
(worker)

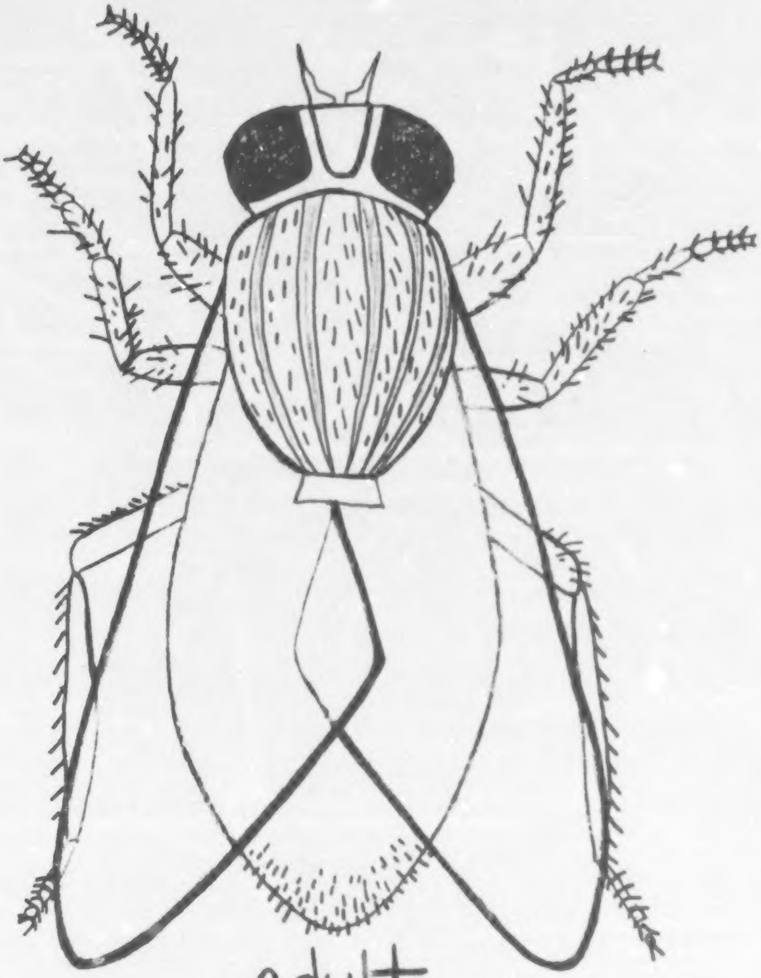


larva

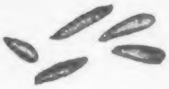


pupa

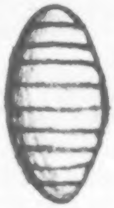
HOUSE FLY



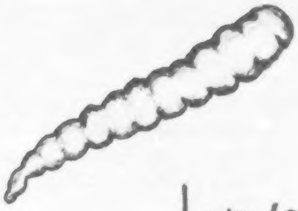
adult



eggs

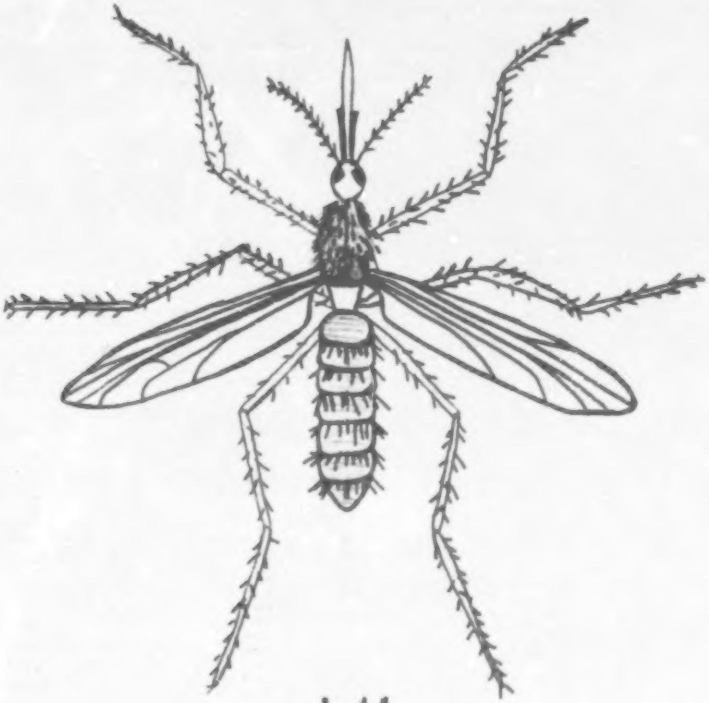


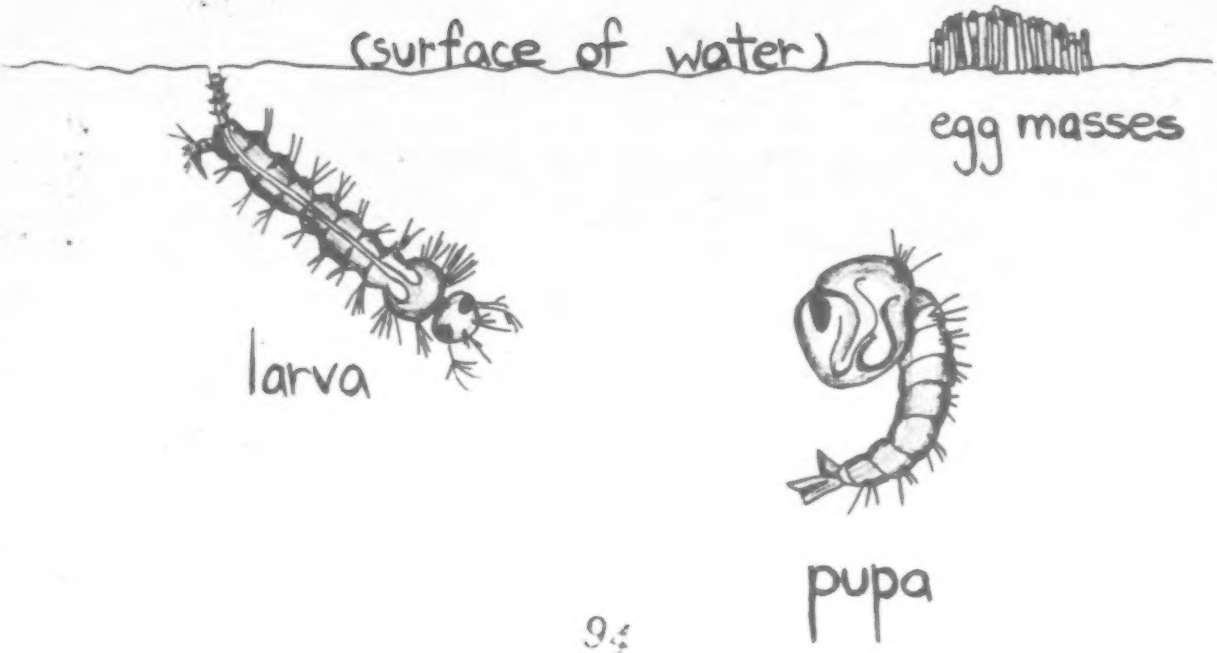
pupa



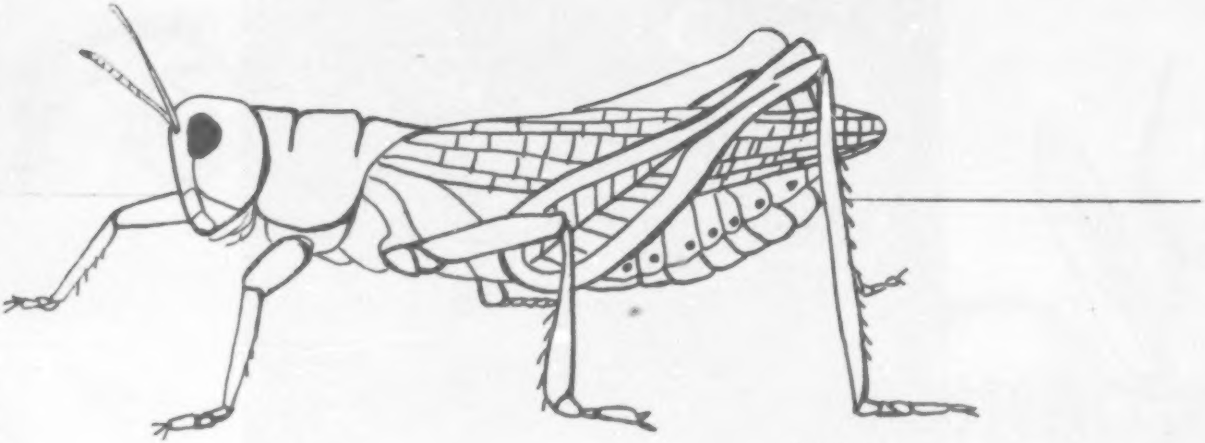
larva

MOSQUITO

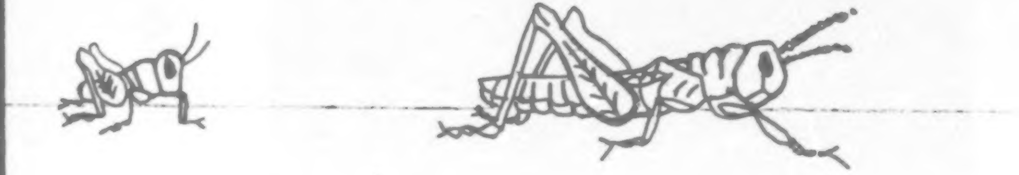



(surface of water)
egg masses
larva
pupa

GRASSHOPPER



adult



nymphs

Grade Three Submitted by Mary Green

MOLD GARDEN

Behavioral Objectives:

1. The student will be able to list three reasons for compost because of what is seen in mold gardens.
2. The student will be able to summarize what has happened with the mold garden.
3. The student will be able to predict what will happen in a compost.
4. The student will be able to illustrate on a chart the different stages of decomposition.
5. The student will be able to create a plan for getting rid of garbage other than burning.
6. The student will be able to compare how organic (vegetable) matter and inorganic matter decompose.
7. The student will name the kinds of matter that will decompose.
8. The student will be able to make a mold garden as specified in the learning activity.

Directions to the teacher:

Discuss molds: what are they? Decomposition: what does it mean? What will happen? Gather round metal cans or plastic jars six to eight inches in diameter and three to four inches deep; plastic wrap, rubber bands, kitchen refuse-vegetable not protein; inorganic matter-cellophane plastic, etc.

Divide students into several small groups with half using organic matter and half using inorganic matter. Use clean plastic lids to cover each garden, remove a few minutes every day for oxygen. Water once in a while when dry.

Directions to the students:

Bring soil, from garden or under shrubbery, from home. Put soil in container and pack down firmly. Measure soil-it should be one inch down from the top of the container. Place five items on the soil-items should be no more than one half (1/2) inch in diameter. Cover container with clear plastic and hold in place with a rubber band. If soil looks dry add a little water. Take plastic off a few minutes every day so molds can get oxygen.

Materials:

Cans or plastic jars, 6"-8" in diameter and 3"-4" deep; soil from under shrubbery or garden; food 1/2" in diameter (DO NOT use protein, banana peel, cereal, nut shells, potato skins, etc.); inorganic material-cardboard, milk cartons, cellophane, plastic transparent wrap and rubber bands.

Comments:

The molds may be all different colors-green, black, red, white, etc. Small worms may eventually be seen. What you observe in your mold garden is what happens in a well-aerated compost. Do not use protein material (cheese, meat, etc.) because it will have a "rotten egg" odor.

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Grade Three Submitted by Brenda Rickert

SOIL IS ALIVE

Behavioral Objectives:

1. The student will be able to identify and label the three different types of soil; sand, clay and loam or silt.
2. The student will be able to identify the animals that live in the soil and describe different types of food and find out how much is eaten.
3. The student will be able to distinguish between different types of soil by color and texture.
4. The student will be able to discover which animal eats which food and predict which leaf will be eaten first.
5. The student will be able to diagram types of soil and progression of leaf breakdown.
6. The student will be able to categorize the soil and determine which has more animals. He will write and record his findings daily.
7. The student will be able to compare his findings with those of others. He will be able to interpret the group findings and interpret the results.
8. The student will choose his own type of soil, leaves and search for animal types.
9. The student will follow the experiments and report and analyze the results.
10. The student will join groups and compare his findings.

Directions to the teacher:

Divide the room into teams, each student equipped with box, tool, paper and pencil. Go to a relatively undisturbed place. Cover the bottom of the box with an inch or topsoil. Remove all the plants from the soil. Get all soil from the same general area.

Directions to the students:

Draw a large map of the area where the samples were collected. Mark the location of each sample. Describe the spot in terms of plants and trees, open field and grass, brush and small trees, tall trees or marsh, vegetation of dead leaves.

Describe the soil. Dry soil is crumbly, feels dry, falls apart easily. Moist soil feels damp to the touch or spongy. Wet soil drips water when you pick it up or squeeze it. Sandy soil is made up of grains of sand. Clay-ey soil sticks together in clumps, has lots of clay in it. Loamy soil is made up mostly of dead leaves and other organic matter.

Look for sowbugs and leaves. Each student collects materials for his own box. Find three or four dead leaves from different kinds of trees. Try to find leaves that haven't been chewed or broken. Put three leaves in soil box lying flat on soil. Put in sowbugs too.

Put on cover, place box away from heat and sunlight. Keep box moist and check it every day. Any signs of life besides sowbugs? Look at them with magnifying glasses or microscope. Inspect dead leaves each day. Chewed on? Which leaves are chewed on? Record findings.

Get together with other teams to see if you can work out a list of which leaves get chewed up and decomposed first. Check order of preference of leaves. Check which animals are eating which leaves by finding droppings or catching them in the act. Check eating patterns on three leaves--holes, between veins, edges. Draw a map of leaves--color in part that is eaten every day.

Materials:

Plastic shoe boxes or glass containers, magnifying glasses or hand lenses, digging tools, dissecting microscope, pencils and paper, tree identification book, large pieces of paper for maps, team of students.

Data Sheet

Describe Location where soil was collected.

Describe the soil:

Moisture content--choose one
  1. Dry
  2. Moist
  3. Wet

Soil texture--choose one
  1. Sandy
  2. Clayey
  3. Loamy

	Type of Leaf	Date First Chewed Upon	Date Finished
1.			
2.			
3.			

Grade Three   Submitted by Erma Parkins

LITTER WALK AND LITTER GARDEN

Behavioral Objectives:

1. The student will be able to define the term "Biodegradeable" according to the definition given in class.
2. The student will be able to give an example of a biodegradeable and nonbiodegradeable item.
3. The student will be able to predict what litter is biodegradeable.
4. The student will be able to differentiate between biodegradeable and nonbiodegradeable items when given a list of the litter items found during the learning activity.
5. The student will be able to estimate the amount of litter which would be found on all playgrounds in Cheyenne; as well as the proportion of biodegradeable and nonbiodegradeable which would be found.
6. The student will be able to discriminate between the decomposition effects from planting upon biodegradeable and nonbiodegradeable items.
7. The student will inform at least one other person, not in his learning group, about the amount of litter found in the school environment.
8. The student will be able to collect and sort litter as prescribed in the learning activity.

Directions to the teacher:

Divide the students into groups and give each group a litter bag. Give one of them a separate bag and a magnet to "sweep" the area for metal. Then have the class take a "litter walk" around the playground, picking up all the litter they find. Allow about ten minutes for this.

While still outside the students should empty the bags and sort the contents. Then have them estimate the number of pieces of paper, bottles, string, metal, etc. Record their estimates and re-collect litter.

Return to the classroom and have one student write the estimates on the chalkboard. Then lead a discussion of what is meant by the term biodegradeable. The teacher should ask the students how much of the litter they think is biodegradeable. To end the discussion ask them if they can imagine how much litter is on all the playgrounds in this community, in this state and in this country.

Use a variety of the litter collected and make some "litter gardens." This will give the students a better concept of biodegradeability.

Have the students line six or seven shoe boxes with plastic wrap and half fill with soil. Plant two rows in each box with four different items in each row (example: hair pin, a piece of plastic, a piece of aluminum foil, and a piece of newspaper). Use the same items in each of the boxes. Identify each item with a tag on a toothpick. Keep the soil slightly damp at all times.

At the end of each week, carefully dig up the items in one of the boxes. Examine the items for signs of decomposition. Make observations and record them each week, comparing them with the observations of the week before. At the completion of this project ask the students such questions as: 1. Which materials showed signs of wearing down? 2. Which materials are biodegradeable? 3. Which materials could pollute the landscape indefinitely?

Directions to the Students:

You are divided into groups. Each group will take a litter bag and pick up all the litter on the playground. One person will use the magnet and pick up all the metal.

While you are still outside empty the bags and sort all the litter. Make estimates of the number of pieces of paper, bottles, string, metal, etc. and record your estimates. Collect the litter.

Return to your classroom and write your estimates on the board.

Get six or seven shoe boxes, line them with four different items in each row (example: hair pin, a piece of plastic, a piece of aluminum foil, and a piece of newspaper). Use the same items in each box. Make a tag on a toothpick and use it to identify each item.

Dampen the soil and keep it damp at all times.

At the end of each week dig up the items in one box. Make observations and record them comparing them to the observations of the week before.

Materials:

Litter bags, one magnet, six or seven shoe boxes, plastic wrap, soil, toothpicks, paper tags, water and chart or large piece of paper for recording observations.

Grade Three Submitted by Erma Whitmore

RAISING EARLY FLOWERING PLANTS

Behavioral Objectives:

1. The student will be able to name at least five early flowering bulbs.
2. The student will be able to name the kind of environment needed to produce healthy, early-blooming plants.
3. The student will be able to predict which of three choices for a planting area would be most suitable for providing desirable blooms.
4. The student will be able to differentiate between bulbs that are properly planted and those which are not.
5. The student will be able to relate the environments provided to the types of growth observed.
6. The student will be able to contrast plant growth in wet sand and gravel to that which takes place in soil.
7. The student will be able to search for explanations of observable plant growth in at least three environmental conditions.
8. The student will be able to record growth elements in plants on a chart.

Directions to the teacher:

Plan to plant early blooming flowers such as tulips, hyacinths, jonquils, crocus, etc., in three different environments: unprotected, semi-protected, (large flower box under porch roof with southern exposure), and indoors in a pot. Plant all three areas at the same time, late in the fall.

Directions to the students:

Plant bulbs five or six inches deep to the top of bulb. Set in soil with the pointed end up. Rake soil over bulbs and pat. Water thoroughly.

In the spring, make a chart recording days when plants begin to show up in each area. Make chart showing when blooms first appear in each area.

Materials:

Bulbs to be divided evenly in the three areas; appropriate tools for preparing the soils; trowels for use in planting; means of watering after bulbs are planted; helpful instructional materials:

Filmstrips	Roots and Their Work	FS 1157

	How Plants Spread and Reproduce	FS 1J68
Kit	Study of Plant Growth	Kit 16

Comments:

Flower boxes on porch will rely on artifical watering, entirely. Each time precipitation occurs on the unprotected bed, water should be supplied to the boxes under the roof. Indoor bulbs can be grown in wet sand and gravel. Size and condition of plants should be compared.

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Grade Four   Submitted by Jessie Easton

MAN'S INFLUENCE ON THE ENVIRONMENT
PLAINS INDIAN VS. WHITE PIONEER

Behavioral Objectives:

1. The student will be able to identify natural resources.
2. The student will be able to discuss needs for natural resources, and their scarcity; seek out causes of, and effects of destruction of resources; effects of land pollution on air and water cycles.
3. The student will be able to demonstrate good conservation practices by helping eliminate pollution at school and in the community.
4. The student will be able to pick out wise, multiple use methods of conservation; uncover and discuss complexities influencing use.
5. The student will be able to understand and discuss interrelationships in nature, needed diversity, dependence of living things, adaptations.
6. The student will be able to compare Indian and pioneer civilizations and their effect on the environment.
7. The student will be able to discuss values involved in use of environment by Indians and pioneers. Use above as basis for comparison of present day abuses--pollution and destruction of resources.
8. The student will be able to map the city with emphasis on present land usage; propose alternative usage of rundown areas, and areas of future expansion.

Directions to the teacher:

This is designed to develop within the framework of the Wyoming Social Studies unit a study of the influences of both the Indian culture and white pioneer culture with special emphasis on their effect on the environment.

Objectives -- to develop these understandings

Plains Indians:

lived in unity with environment; profound respect for deities related to nature; migration for reasons of food and weather; utilization of every part of animal; adaptation to climate, natural surroundings; imitation of animal behaviors; survival dependent on living area including freedom from stress, stable reproductive process; non-depletion of animal life, migration -- same effect as rotation.

White Pioneers:

immediately began re-shaping environment by cutting trees, plowing, planting wrong species, over-grazing, mining, trails, railroad, over killing, other extravagant use of resources and they lacked understanding of how resources serve us and knowledge of conservation.

Pupils understanding of conservation practices, effects of pollution, good conservation practices.

Stress difference between wise use of natural resources on part of Indians and destruction of resources, changes in environment and unwise use of resources on part of whites.

Directions to the students:

Make models of sodded and bare soil. Compare effects of rain. Locate and list any erosion areas in the neighborhood. List uses of land in the neighborhood. Plan a demonstration of the pyramid numbers in a food chain. Discuss predators, their interrelationships with other living things; pesticides, herbicides. Debate on the above.

Devise a scheduled program of school ground clean up. Graph different types of pollution found on school ground.

Make ecology poster, display in local businesses. Make bulletin boards. Have class meetings to discuss values of various ecological problems. Collect newspaper clippings. Plan field trips to nearby mines, oil fields, grazing areas, sand pits. Map the city with emphasis on land use; oiled or concrete areas, such as parking lots, airports.

Plan field trips to locate Indian teepee rings, camp sites, arrowheads, tools, pottery, beads. Identify tribe by type of artifacts. Discuss culture. Discuss location where found, why. Make drawings of buffalo chase, cricket surround, etc. Make models of the above. Make pottery objects with clay, painted and fired or unfired. Compose Indian songs.

Have interviews with early settlers and oldtimers.

Audio-Visual Materials:

These materials are from Laramie County School District Number One, Audio-Visual Department.

What We Need, Natural Resources	FS-1186
How We Get, Natural Resources	FS-1187
Where We Find It, Natural Resources	FS-1188
Conserving Our Soil and Water	FS-1A13
Environmental Crises Series	Kit 170
Environmental Problems Evaluation	Kit 187
Conservation Story	SS-86
Ecology, Population and Communities	SS-80
Ecology, Problems in	SS-81
Ecological Succession	SS-79

Our Vanishing Wildlife	MP-260
What is Soil	MP-32
Urban Ecology: A Park Pond and a Grass Yard	Kit 214 II
Urban Ecology: A Paved School Yard A Vacant Yard and a Park	Kit 214 I

Grade Four Submitted by Irene Forwood

WATER - MAN'S INFLUENCE UPON ENVIRONMENT

Behavioral Objectives:

1. The student will be able to state facts that we cannot run out of water but we can render it useless.
2. The student will be able to explain that within the next ten years most of us will be using recycled water.
3. The student will be able to demonstrate how water picks up pollutants from the air, soil, and rocks and carries it to rivers, lakes and oceans.
4. The student will be able to illustrate by making murals and bulletin boards.
5. The student will be able to plan methods of protecting himself and others from using polluted water.
6. The student will be able to summarize the investigations and findings toward individual solutions.
7. The student will be able to question man's ability to control nature without running out of usable water.
8. The student will be able to alter his habits when it is discovered that careless usage results in waste and/or pollution.

Concept:

To promote an understanding of the present status of one of earth's resources, namely water, and to point out that man cannot always control his environment to his advantage--if he persists in upsetting the balance of nature.

Directions to the teacher:

Instill the concept that all the water the world has ever had or ever will have is with us now. Because of the hydrologic cycle (evaporation, condensation and precipitation) the actual amount of water in the biosphere has remained constant. It is nature's plan that water recycle and purify itself. Although we are not running out of water, we are running out of usable water. With more and more water and less suitable water available, many believe that within the next ten years the good water will disappear unless drastic measures are taken.

Read about the recent testimony of Jacques Cousteau and Jacques Piccard before the United Nations symposium on the ocean environment in Geneva. Piccard warned that if nothing is done, all the oceans will be dead before the end of the century.

Scientists point out that although water covers 70% of the earth's surface, it cannot be treated as a bottomless sewer. Phytoplankton in the primitive plant life that generates most of earth's oxygen. If we kill this surface phytoplankton the entire marine life cycle is disrupted.

Air pollution from the lands rise into the atmosphere and eventually precipitate onto the ocean surface. Up to 1.8 million tons comes from auto exhaust emissions. Tankers spill another million. The world's polluted rivers spew out the rest.

Piccard says, "Curbing industrialization, and especially forcing down the world-wide birth rate may seem unattainable goals, but it's a matter of to be or not to be."

Man's effort to control nature is not always as successful as he envisions it. There are many who now say that the Aswan Dam is a disaster. According to Claire Sterling the dam has impoverished an already destitute nation, driven the fish from the eastern Mediterranean, exposed the whole Egyptian coast to erosion, robbed the Egyptian soil of the silt that made it the most fertile in the world, threatened millions of acres of land with salinity, set off an explosion of water-borne diseases, and squandered the very water it was meant to save.

Water and Life:

All people, animals, and plants are mostly water. Life would be impossible without it. You require at least five pints a day. A horse needs about 15 gallons a day. Your body is 65% water.

Water at Home:

Water is used to clean your body, dishes, clothes, floors and cars. Air conditioners remove water vapor from the air to cool houses. Sprinklers spray it on lawns to keep them green. Wastes are flushed by water through pipes and sewers. You need about 70 gallons of water a day in your home. (Figure how much in a month, or a year).

Water at Work:

It takes 65,000 gallons of water to make a ton of steel, and almost that much for a ton of paper. Oil refineries use about six gallons of water for every gallon of gasoline they produce. Oceans, lakes and rivers are routes for carrying people and goods around the world. Irrigation is used to water crops. Waterways are homes for wildlife.

Recreation:

Water in various forms provide people the pleasure of swimming, fishing, boating and many other kinds of outdoor recreation.

Pollution:

Water is polluted when it is unsafe to use, largely because of sewage and wastes dumped into it. Polluted water may smell, have garbage floating in it, be choked with trash and be unsafe for swimming or boating.

Detergents that were developed to work in hard water contain phosphates--and these chemicals could not be broken down by bacterial action as regular soaps can. As a result, mountains of suds were dumped into the waterways. The phosphates cause tiny green algae to grow, multiply and clog our waterways. Soon the green mats of plants turn dark and smell as they die. Bacteria in the water can normally break down a certain amount of the algae, but they cannot handle these huge amounts.

Phosphates and industrial waste pollute our waterways.

Water Treatment Before Using:

What happens to the water that is piped to your home depends on the source of the town's supply. If it is pumped from a deep underground well, it is probably pure enough to be pumped to neighborhood storage tanks and from there to homes, stores, and factories. If it comes from a lake or river, it must be treated at a municipal purification plant. A visit to the local water treatment supply would answer many questions.

Water Treatment After Using:

All water used to be dumped back into the waterways. There was enough clean water to dilute the wastes and nature's self-cleaning processes could take over. Bacteria and other microscopic plants and animals in the water could break down the wastes into harmless substances.

Now most communities have too much waste material for nature to handle it. The water must be cleaned before it goes back into the waterways. Most cities have sewage treatment plants to remove many of the pollutants. Another field trip to the sewage plant would answer more questions.

Approach Activities:

Bulletin board (large)

Prepare a large board with mural paper. Place only the caption across the top reading, "The Death of a River." Define a river--where it starts, where it ends, what structures may be found along its banks. Research for art work. Make preliminary sketches on newsprint. Each part may be made by groups and stapled together.

Bulletin board (small)

Mount a small board with the caption, "Water Pollution: A Grave Problem." Children look for sources of pollution, print them on small pieces of paper shaped like gravestones. Place them in alphabetical order.

Table Display:

Resource materials, pamphlets, pictures, and supplies for building the mural and bulletin board.

Language Arts:

Have the students either individually or in groups write several paragraphs following a drop of water through the hydrologic cycle.

Booklets:

Each student should keep a daily booklet recording the unit as it progresses. Covers could reflect appropriate art designs.

Field trips:

Watersheds; water purification plant; sewage disposal plant.

Filmstrips and movies:

Conserving Our Soil and Water	FS-1A14
We Explore Ocean Life	MP-215
The Conservation Story	SF-86

Directions to the students:

Math: To reinforce study of measures (gallons, quarts, pints.) Take the students outside to collect and measure various quantities of snow. Then let it melt and measure the collected water.

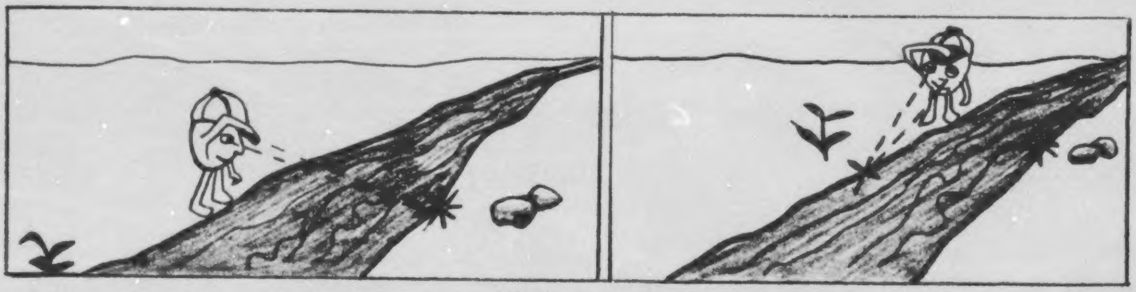
Science: Compare the volume of water to the amount of snow.

Language arts: Require written and/or oral reports on findings of the experiment.

Ecology: Explore thermal pollution - the generation of heat through atomic power, the burning of fuels, and the carbon dioxide in the atmosphere. If our atmosphere becomes warmer, what would happen to the ice at the north and south poles - to our oceans, our coastal cities and the plant and animal life there.

Estimating the width of a stream.

Place a hat with a visor on your head. Stand on the bank of the stream. Place your chin on your chest and adjust the hat visor so that your line of vision seems to meet the tip exactly at the far bank of the stream. Turn without moving your head so that you are looking down the bank of the stream. Notice where your line of vision meets the visor of the hat and pace off the distance to that spot. This will be approximately the same distance as that across the stream.



How Much Water Do Things Contain?

Cut some thin slices of potato or some other fresh vegetable; weigh the slices and record the weight; put them near a sunny window to dry--then reweigh. The difference between the first and second weights is the amount of water lost.

Do the same with a worm.

To Save Water:

Notice the ways you use water around the house. How much water is used to wash the family car? Get a watch with a second hand and time how long it takes to fill a one gallon bucket with water from a hose. Use the same hose pressure that is used when the car is washed.

Now, time how long the hose runs while the car is being washed. What is the number of gallons used? You can see why it is good to use water in a bucket to wash cars instead of running it through the hose.

Don't let water keep running from a faucet while washing dishes or brushing your teeth.

Don't let water run just to get a cool drink. Keep a container handy in the refrigerator.

Sprinkle lawns and gardens in the early morning or evening. Less water is lost at these times. Heat from the sunlight causes water to change to water vapor and rises into the air. During the daylight plants lose water vapor in the air (transpiration). To see this--tie a clear plastic bag around a small leafy branch. What happens inside?

Taste:

Pure water is tasteless and is not often found in nature. Water gets its taste from minerals and oxygen in the air. Test to see the difference in taste between water with air in it and water that is flat, or has little air in it. Boil a cup of water to force out the air. Taste some of it when it cools. Now pour the remaining water back and forth ten times from one cup to another. Taste the mixed water.

Smell:

Collect separate fresh cups of water from a faucet, a swimming pool, and a lake or pond. Do they smell different? How do you explain your observation.

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"Teaching Soil and Water Conservation, A Classroom Guide" PA-341, U.S. Dept. of Agriculture, 1971, p. 8.

"Water, What Would We Do Without It?" Ranger Rich, (October, 1970) p. 26-33.

Grade Four Submitted by Ann King

PACKET STUDY FOR OUTDOOR ENVIRONMENTAL STUDIES

Behavioral Objectives:

1. The student will be able to describe and define environment to the teacher's satisfaction in class discussion.
2. The student will be able to cite examples of area pollution on a given map, and indicate possible causes and sources in class discussion.
3. The student will be able to map the immediate environment and indicate residential and commercial districts.
4. The student will be able to compute area damage to local plants and species of native animals.
5. The student will be able to summarize the ways land and water have been used and abused by man in his mapping study.
6. The student will be able in retrospect conclude cost to society of pollution and abuse of resources.
7. The student will be asked for emotional out-growths of smells, sights, sounds, and general feel of pollution.
8. The student will be able to suggest modifications of his existing values when they collide with environmental values.

Directions to the teacher: Activity will consume at least three field days

Consider the level of your class. Some fourth graders will have to make classroom maps first and other fourth graders will be ready to start area mapping immediately.

In mapping the area the students should start with their own block and take pains to indicate pollution, its causes and sources. (Some students may be more comfortable referring to the city directory map for directions.)

Have the class practice field-mapping-skills. Students will need sketch pads and pencils for this activity. Erasers and litter bags may also prove helpful.

Directions to the students:

Field-mapping activity: Today we will begin our studies of the Crow Creek Area. In our unit we will explore the ways people have used the land and the water in this area. We will begin by making our maps of Crow Creek beginning at the Dey Street underpass and ending at the Ninth Street Bridge.

We will map only frontage areas to begin with (frontage areas are areas that face the street). We will then determine whether each area is primarily commercial or residential or a combination of the two. If the area is

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commercial, let's number it 1; if it is residential, let's number it 2; and if it's both; 1 and 2.

As we map and move let's look for pollution. Here is what we can look for in reference to pollution. Garbage overflowing and unchecked in backyards and alleys. Abandoned houses with rotting floors and varmints in evidence. Oil and pollution in the creek causing oxygen depletion and ultimate death of denizens. Keep a sharp outlook for visual pollution; this consists of topography pollution or papers and stuff all over.

Now, we have set forth two tasks, map the area and look for pollution. The next task is to look for ways that man has changed the environment and the resulting damage to native plants and animals. Also try to be alert for native plants and animals that have gained a foothold with the advent of man, and try to decide whether these new plants and animals are harmful or helpful.

Materials:

Paper, pencil, eraser and litter bags.

Comments:

Time should consist of at least three days in the field. These periods may vary in accordance with instructor's discretion. A fourth day in the classroom is necessary to culminate the activity. Time spent here should be on individual wrap-up projects; reports, discussions, bulletin boards, displays, plays, posters, teacher-made tests, etc. Satisfactory wrap-up will, however, probably consume two or three class periods.

This project can be adapted to any area in which your school exists, or from which the students emanate.

Teacher may want to display mapped area on overhead or chalk board to help children relate to project. Have the students number or letter areas on blocks 1, 2, or 1 2; and list ways land has changed naturally or been changed by man.

References:

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Grade Five Submitted by Leslie Bateman

HOW DOES AIR POLLUTION AFFECT OUR COMMUNITIES?

Behavioral Objectives:

1. The student will be able to identify how air pollution is measured.
2. The student will be able to give examples of three major sources of air pollution.
3. The student will be able to relate three major sources of air pollution to specific examples of each of these sources in Cheyenne.
4. The student will be able to identify three ways in which air pollution affects man.
5. The student will be able to explain to what degree Cheyenne has air pollution.
6. The student will be able to order three sources of air pollution as each of these contributes to the problem in Cheyenne.
7. The student will be able to describe one evidence of air pollution in the community which can be observed.
8. The student will be able to use at least one locational skill to obtain information about air pollution.

Directions to the teacher:

This unit lends itself quite well to the correlation of science, mathematics, language arts, and the study of the United States in social studies at the fifth grade level. With adaptations, it could be used in correlation with third grade social studies and the community, fourth grade study of Wyoming, and sixth grade study of other countries. Art and music activities can also be correlated by creative students and teachers; for example students could have a pollution poster contest, write lyrics for a pollution song, etc. Many opportunities for creative thought can be developed during the course of the unit.

Although certain activities will lend themselves to whole class discussion and participation, the majority are best suited to individual and small group investigations after which they may wish to share their findings with other members of the class, the school, and community via panel discussions, booklets, posters, debate assemblies, and other means.

Through a study of pollution in the community, students can formulate understandings about air pollution and its effects. Then, they can write to students in places they are studying in social studies and compare their communities to others. Try to achieve a balance of regions studied, urban, suburban, and rural areas within each region.

Aspects of the thought processes stressed include observing, measuring, describing, classifying, interpreting, inferring, experimenting, and formulating hypotheses.

On-going evaluation is a most important part of any unit, and can provide valuable insights into the students and their successes dealing with the materials of the unit.

While in the unit, and after its culmination the teacher should be asking questions like these:

> How flexible are we? How well am I planning, did I plan? Do we take full advantage of new ideas as they develop, and add them to the unit? How much of the planning were the students able to do? Are we contributing toward each other's functional understanding of facts and principles? Are the needs and interests of each student being met? If not, why not?
>
> Are students engaging in a variety of activities, enjoying a number of experiences and using numerous materials? Are we accomplishing our objectives? If not, which do we need to revise, work on more, eliminate from our unit? Does the unit as a whole seem meaningful? Are we correlating the activities of social studies, science, math, language arts, art, health, and music?

Directions to the students:

Included in this unit on air pollution are some suggested topics. Feel free to suggest additional topics to your teacher. Also, if you can think of better activities, different topics, or a more interesting way to study a certain thing, be sure to tell your teacher. Your limits are those you set yourself. You may be as creative as you can, and study a topic as fully as you wish. However, you and your teacher determine reporting methods.

Don't stop with just one answer to a question! Air pollution is a very complex subject and even the scientists do not know all the answers nor are they sure which solutions are best. Be a super sleuth!

While you are studying various things about air pollution, be asking yourself these questions.

> Am I learning about major causes of air pollution, both in my community and around the nation? What effect is air pollution having upon me and my health? How can I help to eliminate the problems of air pollution in my community? How is my community trying to safeguard me against the effects of pollution? Am I doing my best when I am working by myself and with others as we are learning about air pollution?

Student Activity Cards:

Group A

What is air pollution? Can we see it? Can we smell it? Can we taste it? Can we hear it? Can we touch it?

Group B

What does a Ringlemann Smoke Chart measure? What does it not measure? How is it used? Does any agency or group in town use one? Can you learn how to use it? Where could you get one?

Group C

Are odors considered air pollution? Do parts of our town "smell bad"? If so, why? What do people who live there think about the odors? In what ways could you find out what they think?

Group D

What are some of the major causes of air pollution in our town? What would be a good way to find out? How much of our air pollution is due to cars? to industry? to air planes? to other factors?

Group E

Does geography affect air pollution? Why or why not? Compare the geography of our area with that of another area whose air pollution problems you can find out about. How could you best show what you have found out?

Group F

What are some of the major causes of air pollution in another part of the country? Are their problems different than ours, or are they the same? Why do you think so?

Group G

How does weather affect air pollution in our town? You can think of many ways to find out. Here are a few "starters." Which kind of days have worse air pollution - windy or calm? How does the air look and feel after a heavy rain? Is air pollution generally worse in warm months or cold ones?

Group H

How does air pollution affect our health? Can a large quantity of air pollutants be as bad for us as heavy cigaret smoking? Why or why not? How can you show this?

Group I

How does air pollution affect other things in our community? in other communities? What happens to paint on the outside of houses? What happens to metal on our roofs, cars, and other objects? What kinds of experiments could you do to show these things? How could you check your results with research that has already been done? What exterior building materials are recommended by builders in your town? Why do you think these are preferred?

Group J

How does air pollution affect plant and animal life? What ways could you use to find out? Try an experiment or two using plants--you may wish to devise your own experiment.

Group K

How are air pollution problems presented in newspapers and magazines in your town? in other towns? Are the articles factual? fictional? a combination? Why do you think as you do? Try to write an article for your school paper or community paper. What kinds of things do you want to include? How about pictures? Check in your school or city library. What magazines include articles by students? Could you submit an article to one of these publications?

Group L

In what ways does air pollution affect property values in our community? Do other communities have similar situations? Why or why not? If so, what is being done about the problem?

Group M

What laws control air pollution on a national level? state level? community level? How are these laws enforced? What are the penalties for guilty polluters? How much control does the federal government have over pollution on your community? Is that too much, just right, or too little, in your opinion? Why do you think as you do? Do others agree with you, why or why not? Is cooperation needed between towns and areas of the region?

Group N

What are auto manufacturers doing to help cars

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produce less pollution than they have in the past? What can your parents do with their cars to help lessen pollution? Are any cars in your neighborhood powered by propane? If so, would the owner come to school and talk with you about his vehicle?

Group O

Does your town have a chapter of "Bicycles Now!"? Do any other communities you know of have chapters? Can many people in your town walk or ride bikes to work? to the grocery? to school? How can you and your classmates encourage more people to leave their cars at home? What can your local government do? What can local industries do?

Group P

What organizations in your community are anti-pollution? How can you find out more about their work? What departments of your state government are concerned with pollution? What are their major methods?

Group Q

What part can citizens play in helping the community solve its air pollution problems? What have citizens, both as individuals and as groups, been able to accomplish in other communities?

Group R

Are there good movies and filmstrips available on air pollution? If so, could you and your teacher arrange to borrow several to show your classmates? Take the lead and see the film or filmstrip before the class sees it, prepare questions so you can lead the discussion before and after showing it.

Group S

Is air pollution a problem in your schoolroom? How could you show that it is or isn't? Design and carry out an experiment to prove what you think.

Group T

What tragedy occurred at Donors, Pennsylvania? What happened in London, England? Will such tragedies occur again? Why or why not?

Group U

What is smog? How is it formed? What can be done about it? Is it a hazard to driving? to health? to other aspects of community living? What can be done about it? What is being done right now? What more needs to be done? How can you help?

Group V

Why is the proper functioning of home heating equipment important?

Group X

Write a skit or play based on something you have learned about air pollution. Here is an idea, the cast might include a representative from an industry known to be polluting the air, a doctor or a public health nurse, a health inspector, a citizen with a complaint, and expert on air pollution.

Group Y

Present the play for your classmates, others in your school, a community.

Group Z

What possibilities do steam and electricity powered vehicles have in the fight against air pollution? Does anyone in your town have a steam car or an electric car? (hint: Cheyenne Light, Fuel, and Power Company may be able to help.)

Group AA

Think about the future and how air pollution could affect it. Develop a story, play, booklet or bulletin board for your class. Perhaps the title could be "This? or This!".

Group BB

Have a creative writing session. Possible topics could include: How Pollution Got Its Name; Is Our Sky a Sewer? What would Happen if: All Industries with Smoke Stacks Suddenly Shut Down?; Air Pollution Went Unchecked?

Group CC

What would your daily diary read like if you were...An air pollution inspector?; A smoke watcher for Consolidated Edison in New York City?; A member of a board of directors of an industry faced with an air pollution violation notice?; A manufacturer of electrostatic precipitators?; A member of the Wyoming Air Resource Council?

Group DD

Produce a book! Members of your class who have done research on various air pollution topics can contribute chapters. Help them write their material in a style even younger readers can understand and enjoy. Pictures always help, too.

Group EE

Plan a Clean Air Week! Who could help you in preparation? Have other schools, other communities had successful Clean Air Weeks? What kinds of activities would you include? How many people should be involved in the planning?

Group FF

It has been suggested that building higher smokestacks will get the air pollution they produce up away from the city and the problems of air pollution will decrease or cease. Will the problems really be cured? How high a smokestack can an industry build?

Group GG

Can you devise an experiment to show particulate air pollution material using the following: microscope slides, microscope, and petroleum jelly. Can you make charts or maps showing what you discovered?

Group HH

How is fog formed? How is it different from smog? Can you do an experiment to show how fog is formed?

Materials:

Because of the open-endness of many of the activities, it is suggested that students determine their needs for a specific activity and then develop ways to get the materials--bring from home, ask teachers at school, write various organizations, etc.

The following might provide a start as the unit begins: microscope; filter paper; chart paper or graph paper; art supplies; tape recorder, blank tapes; A.V. catalog from the local school district; Ringelmann Smoke Chart; names and addresses of various organizations outside the local region (students should find out as much as possible about their area on their own).

Persons in the community who might be contacted by the students would appreciate a note or phone call from you describing in brief the type of open-endness you are stressing and thanking them in advance for their cooperation. Two people in the Southeast Wyoming, Northeast Colorado area you might wish to contact for background information are: Charles C. Macnamara, Senior Health Educator, The Center for Air Pollution Information in the Rocky Mountains, Denver, Colorado and Robert Sundin, Wyoming Department of Public Health, Air Pollution Section, Cheyenne, Wyoming.

Motion Pictures:

Encyclopedia Britannica:	Megalopolis-Cradle of the Future
Sinclair Oil Co.:	As We Live and Breathe
U.S. Dept. HEW:	Breathe At Your Own Risk
	Expedition: City Fallout
	Ill Winds, Ill Waters
	Is Our Sky a Sewer
	Let's Clear the Air
	Our Poisoned Air
	Sources of Air Pollution
	Effects of Air Pollution
	Control of Air Pollution

Pamphlets written with student readers in mind:

Air Pollution: The Facts, American Tuberculosis Assoc.

Clearing the Air, Bureau of Mines, Department of the Interior.

Effects of Air Pollution, Public Health Service Pub. #1556, U.S. Dept. of Health, Education, Welfare.

Smog and Weather, National Coal Association, Washington, D.C.

Needed: Clean Air-The Facts About Air Pollution, Channing Bete Co., Greenfield, Mass.

Take Three Giant Steps to Clean Air, Public Health Service Pub # 1551, U.S. Department of Health Education, Welfare.

You Can Help Keep Air and Water Clean, Humble Oil Co., Houston, Texas.

The Air We Breathe, Humble Oil Co.

No Laughing Matter, (book of air pollution cartoons which have appeared in magazines) Public Health Service Pub. #1561, U. S. Dept. of Health, Education and Welfare.

Sources of free and inexpensive materials:

Air Pollution Control Association, 4400 Fifth Ave., New York, N.Y. 15213.

Air Pollution Control League of Greater Cincinnati (Clean Air Week) 2400 Reading Rd., Cincinnati, OH 45202.

Bureau of Reclamation, Office of Chief Engineer, Denver Federal Center, Denver, Colo.

Humble Oil and Refining Co., Public Relations Dept., P.O. Box 2180, Houston, TX 77001.

Izaac Walton League of America, Director of Information, 1326 Waukegan Road, Glenview, IL 60005.

Keep America Beautiful, Inc., 99 Park Ave., New York, N.Y. 10000.

Los Angeles County Air Pollution Control District, Public Information Office, 434 South San Pedro St., Los Angeles, CA 90013.

National Tuberculosis Association, 1790 Broadway, New York, N.Y. 10019.

National Wildlife Federation, Conservation Education Division, 1412 16th St., North West, Washington, D.C. 20036.

New York State Air Pollution Control Board, 84 Holland Ave., Albany, N.Y. 12208.

Sierra Club, 1050 Mills Tower, San Francisco, CA 94104.

Public Health Service, Division of Air Pollution, U.S. Dept. of Health, Education and Welfare, Washington, D.C.

Grade Five Submitted by Charles Zumo

RECYCLING OF RESOURCES

Behavioral Objectives: Part One

1. The student will be able to define recycling.
2. The student will be able to give two examples of products that are being recycled at the present time.
3. The student will be able to discover at least three steps which are being used in a recycling process in his own community and one other community.
4. The student will be able to identify one economic problem and one feasibility problem which must be solved if recycling of paper is to be successful.
5. The student will be able to devise a plan for the recycling of one common household product that is not being recycled at present in his own community.
6. The student will be able to state one conclusion supported with at least two facts regarding the question: "Which common product does our community need to recycle at the present time?"
7. The student will be able to prepare a graph or chart showing the relative costs of recycling three products.

Directions to the teacher:

Assign the students to find out what can be recycled, the costs involved, and the feasibility of recycling. Obtain films and other materials available on recycling, have community resource personnel talk on subject, take a field trip.

Directions to the students:

Do research on the subject of recycling. Find out if recycling is being done in your community. Find out the costs involved, etc. Find out what can be done to waste products - garbage, etc. Write letters to towns that are doing recycling and to companies such as Coors, that are recycling.

Materials:

Films; recent periodicals on subject of recycling; examples of beer cans, bottles, and tin containers of soft drinks; examples of returnable and non-returnable bottles, milk cartons, etc.; paper samples that have been recycled.

Comments:

Plan a project to involve the students. Collect paper and aluminum beer cans, etc., as a class project. Students should become aware of the other things that can be recycled.

MAN'S INFLUENCE UPON HIS ENVIRONMENT

Behavioral Objectives: Part Two

1. The student will be able to help make people aware of what man has done to affect his environment.
2. The student will be able to develop the idea that everything man has done has affected his environment.
3. The student will be able to find out the ways in which man has polluted his environment.
4. The student will be able to determine what effects will be less detrimental to his environment.

Directions to the teacher:

Assign pupils to make observations as to what man has done to change the environment. Examples: houses, paved streets, highways, buildings, factories, etc., what effects will these have on the environment, i.e., rain absorption, water runoff, etc.

Directions to the students:

How do you affect the environment? Do you wash a car? take a bath? empty the garbage, etc.? How do industries affect the environment? For example, smoke, dust, dumping chemicals in streams, etc.

Grade Six Submitted by Brenda Rickert

EARTH POLLUTION: WHAT IS IT? WHAT CAN I DO ABOUT IT?

Behavioral Objectives:

1. The student will be able to define "pollution" according to class discussion, select definitions of biodegradeable, nonbiodegradeable, and recycling from a list of definitions of terms.
2. The student will be able to state an example of a biodegradeable substance and a nonbiodegradeable substance.
3. The student will be able to predict which of two soil sample types would include degradeable and non-degradeable products will change more rapidly in color as a result of regular watering.
4. The student will be able to discriminate between those soil samples which contain degradeable substances and those which do not contain biodegradeable substances.
5. The student will be able to explain why recycling processes are important to the production of food products.
6. The student will be able to conclude which of two methods of disposing of solid waste would be superior when presented with a recycling method and a non-recycling method.
7. The student will be able to tell about one contribution he has made to the cleaning of litter at school and at home.
8. The student will be able to record accurately noted changes in "crops" on a time line. Accuracy will be determined by the ability of the student to point out changes to the teacher.

Directions to the teacher:

Discuss "earth" pollution. Ask students if they have seen it in their own homes and at school. Discuss their findings to see if they know which are degradeable. An important concept here is that trash that cannot be recycled loses its usefulness to living organisms. Each nondegradeable product removes from circulation a portion of the earth's natural resources. The natural input-output systems can no longer use that portion.

Have jars for each student. Fill halfway with different soils. Some types of litter to use are: cardboard, paper, nails, cans, plastic, glass. Make small notebooks to record changes and lengths of time for changes. Also keep a running vocabulary list of ecological terms on the chalk board.

After a period of time, discuss the crops with the class. Determine the results. Use a bulletin board to record the crops. Indicate failure of success in being degradeable. Use vocabulary that has come up in the course of the student's experiment.

Directions to the students:

Look around the school yard. Bring in litter, Label each kind as natural or synthetic. Bring in examples from home. Label each. Label each jar as CROP. Place different pieces of litter in each jar so they are visible under the soil. Water each jar regularly. Some can be kept drier to see different results from other conditions.

Record changes in your crop. Is it molding? Is it disappearing? Is it changing color? How long did it take to change? Did it change? Check on your fellow student's crops. Discuss their results. Decide which crops are degradeable. What helped some to degrade? (Rust, mold, etc.) Which crops will eventually return to the soil and which will be an eyesore for the community? Use your record book to contribute to the bulletin board. Find out where trash goes from you to trash truck.

Comments:

Discuss the billions of dollars wasted getting rid of nondegradeable products. What methods can the students think of that are used to recycle solid wastes? Examples: Glass...ground up for roads; junked cars...scrap steel; newspaper...clean newsprint; trash...glass tubing, tiles.

Make reports on information found through community resources. Discuss what each person can do in cleaning up litter. Determine if man is intelligent enough to survive the environmental problems he has produced. Write stories using ecological terms.

References:

R.S. Abelson, Environmental Education Instruction Activities; U. of N.Y., 1970.

Dr. Howard Bruner, and Paul G. Richard, Environment Education Project, Activity Booklets, Title III.

Florida State University, Volume 3A, Probing the Natural World, 1970.

Dorothy Needham, Pollution: A Handbook for Teachers, Scholastic Book Services, 1971.

Albert Schatz and Vivan Schatz, Bioedgrade Ability-Teaching Science with Garbage. Rodale Press, Inc., 1971.

Grade Six Submitted by Tom Rogers

A BALANCE OF PLANT AND ANIMAL LIFE

Behavioral Objectives:

1. The student will be able to define "macrocosm", "microcosm", and "photosynthesis."
2. The student will be able to cite one similarity between earth as a macrocosm and the microcosm created in the activity.
3. The student will be able to predict which of four microcosms will exist most successfully.
4. The student will be able to identify at least two elements which are not present in the unsuccessful microcosms.
5. The student will be able to summarize those elements which must be present for animals and plants to coexist in the water.
6. The student will be able to contrast what would happen if the water in the microcosm became polluted with what would happen if the animal in the microcosm died.
7. The student will be able to locate one information price and report the information regarding contributions animals make to plant existence.
8. The student will be able to record accurate observations of each of the four test tubes.

Directions to the teacher and students:

Although it is not essential, the teaching of this topic may be preceded by a story of aquaria, terraria, microcosms, plants and photosynthesis. If not, concepts of plants and photosynthesis should be developed in conjunction with this activity.

You might begin with a class discussion in which you ask the students what they think would happen if we were to seal a snail in a test tube. Suggest that the students set up experiments to find out what would happen. How should we proceed in setting up the experiments? Accept students' ideas and evaluate them in class discussion. Through appropriate questions develop the ideas of controls and variables in scientific experiments and then use the terms. For example: How will we know when we have some results in our experiments? How will we identify results? With what will we compare? What if we changed the living arrangement of the snail? How could we change it?

At this point, you might organize the students into six small groups. Tell them that each group will receive test tubes, snails, aquarium plants, and stoppers. Ask them to design a complete experiment within each small group to show whether or not these organisms can exist together in a sealed environment. Let students work in groups and develop an experimental plan. Discuss and evaluate these with the entire class.

In general, agree upon a plan similar to the following:
Test tube A--Water
Test tube B--Water and a Plant
Test tube C--Water and a Snail
Test tube D--Water, plant, and snail

Let students assemble materials as outlined above, place stoppers in test tubes, seal with masking tape, and label test tubes.

Student groups should be given time daily to observe their experiments and record illustrated observations in their individual ecology note books. Some time should be devoted to sharing and discussing their observations with the class. The teacher's role at this time should be that of a resource person; listening, guiding, assisting, rather than telling or explaining.

After the experiments have run their course, the activity might be summarized as follows: Illustrate a sealed test tube containing water, an aquarium plant, and a snail on an overhead projector. Ask students to propose statements about life inside this test tube. These may be called "Balance of Life Statements." Discuss and evaluate each of these as proposed, and write the significant ones on the overhead. Students should record this drawing and these statements in their ecology notebooks.

Guide students in comparing this test tube with our planet, Earth. What are the similarities? What are the differences? What problems might they both have? Here is an excellent opportunity to "What if--?" What if something happened to the oxygen supply in the test tube? of the food supply? to the water? to the producer? to the consumer? to the temperature? These what if situations may be compared with actual earth environmental problems and analogies drawn. What role does man play in these real situations.

What role might he play if he is concerned about the environment? Some students may suggest ideas for further experimentation in an attempt to answer certain of these questions. They should be encouraged to design and carry out these experiments.

The class may now be given the attached brief test as an evaluative tool over the activity just completed. Returning and discussing the test can be a review and teaching device.

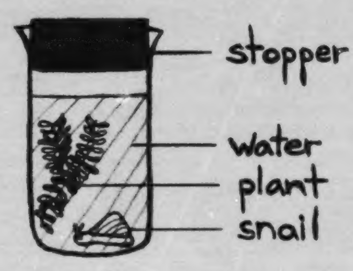
Materials:

Twenty-four large test tubes; aquarium plants (Elodea), twelve small snails; twenty-four solid rubber stoppers to fit these tubes, masking tape, overhead projector and screen; (in the absence of test tubes, small heavy-duty plastic bags sealed tightly with rubber bands may be used.)

Reference:

Morholt, Brandewein, and Joseph, A Sourcebook for the Biological Sciences, Harcourt, Brace and Co., New York, 1958.

Science Test ______________________ Name______________________



Study and think about the above diagram. Mark each of the following statements + for true and O for false.

____1. The plant takes in water.

____2. The plant makes food by photosynthesis.

____3. The snail gives off oxygen.

____4. Oxygen comes from the air in the room.

____5. The snail makes its own food.

____6. The plant uses some oxygen.

____7. Evaporation cannot take place in the test tube.

____8. The snail uses water.

____9. The plant makes sugar.

___10. The snail gives off carbon dioxide.

___11. The plant takes in carbon dioxide.

___12. The water cycle can work in the test tube.

___13. The snail makes sugar.

___14. Carbon dioxide is given off during photosynthesis.

___15. Water is lost from the test tube out into the room.

___16. Light comes from inside the test tube.

___17. Heat comes from outside the test tube.

___18. Food and oxygen are provided mainly through the process of photosynthesis.

Science Test ________________Page 2____Name____________________

____19. This is a type of microcosm.

____20. To keep the balance of life going, the aquatic plant must be a green one.

____21. This is a type of terrarium.

____22. The snail produces waste materials.

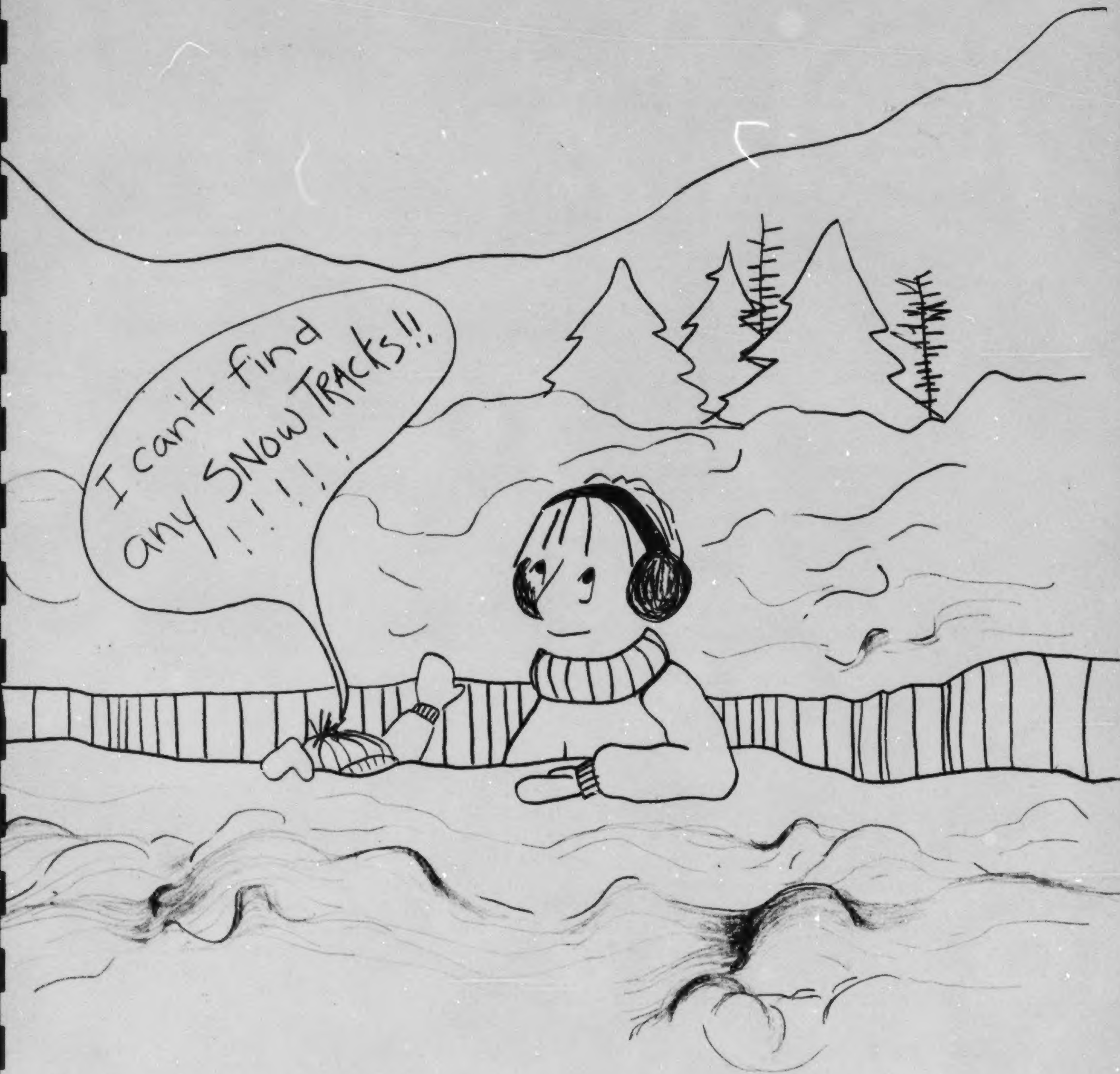
____23. The plant can get minerals from the snail's waste materials.

____24. Condensation could take place in the test tube.

____25. The plant and snail could be described as aquatic.

For TWO Bonus Points:

In what ways is this test tube like out planet, Earth? What problems might they both have? Use sentences to answer these questions.


I can't find any SNOW TRACKS!!!!!!!!

Primary Submitted by Linda Crandall

SNOW TRACKING

Behavioral Objectives:

1. The student will be able to identify animal tracks.
2. The student will be able to explain differences in tracks.
3. The student will be able to discover tracks in snow.
4. The student will be able to describe patterns of each of the animals found at the Eco-Lab.
5. The student will be able to make diagrams of patterns of the tracks.
6. The student will be able to compare the tracks and determine what tracks belong with the animal, in connection with where the animal lives at the Eco-Lab.
7. The student will organize field trips and find different tracks of animals in the snow.
8. The student will make plaster of paris track prints of animals.

Directions to the teacher:

The main responsibility of the teacher is to guide, direct, and provide the students with time to develop and follow through on the activities covered in this unit. The students will use this unit as a beginning in the study of animals and their tracks.

Directions to the students:

The student will make prints of his own feet. Discuss characteristics of toes, heel, special markings, etc. Find material showing animal prints, make diagrams showing specific markings. Make plaster of paris prints of some common animals. Take excursion to the Eco-Lab after it has snowed. Find snow tracks and determine which animals made the prints. Take pictures of the tracks and match them with the pictures of the animals. Determine which animals live where at the Eco-Lab by the tracks. Make a model of the Lab showing the location of the animals found.

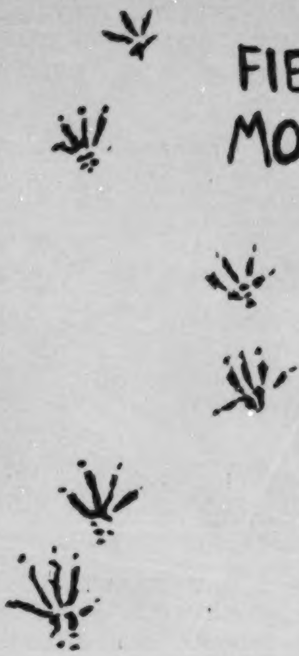
Materials:

Books, snow, transportation to Lab, plaster of paris, camera, pictures of animals, paper, and time.

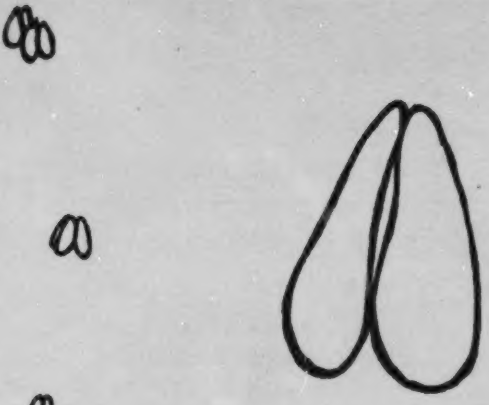
Reference:

George F. Mason, Animal Tracks, William Morrow and Co., New York, 1943.

FIELD MOUSE



MULE DEER



COTTONTAIL

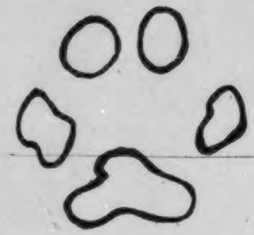
-hops in snow-

MAGPIE

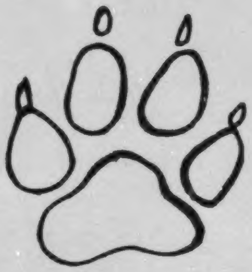
walking
hopping

-in snow-

DOMESTIC CAT



MONGREL DOG



drawings adapted from Olaus Murie's
A Field Guide to Animal Tracks

Primary Submitted by Mary Green

CARE AND USE OF NATURAL RESOURCES

Behavioral Objectives:

1. The student will be able to list orally the things that can be done to care for natural resources.
2. The student will be able to explain conservation.
3. The student will be able to discover through field trips, how man has upset nature.
4. The student will be able to identify good and poor uses of natural resources.
5. The student will be able to plan ways to improve resources at school and at the Eco-Lab.
6. The student will be able to name two ways man has upset nature as discovered at the Eco-Lab, home and school.
7. The student will take a field trip to observe good and bad uses of natural resources.

Directions to the teacher:

Discuss conservation with the class. Natural resources will be abundant only if care is taken. Talk about the use of water fountains, wasting paper, etc.

Have the class list things that can be done to care for natural resources. Have them read articles and look at pictures that are about good and bad uses of land.

Talk about how man upsets nature. Take a field trip around the block and talk about good and poor uses of land, etc. Discuss these more thoroughly back in the room.

Plan for a field trip to the Eco-Lab, use field trip guide, talk about what to look for. Is any land barren, is there any litter, etc.?

After the field trip make plans to help improve the use of natural resources at school and at the Eco-Lab. Plant grass, flowers, pick up litter, etc.

Directions to the students:

How do we waste natural resources? What is conservation? As we walk around the block, look for good and poor resource users. Are there any papers about, etc. Look through magazines at home, listen to the news. See what you can find out about pollution-what is being done, good and bad.

Draw pictures of good and bad practices and put on the bulletin boards. What should we look for at the Eco-Lab? What did you see that could be improved at the Eco-Lab?

Materials:

Magazines, drawing paper, pencils, and crayons.

Primary Submitted by Marguerite Hopkins

ANIMAL TRACKS - WHO MADE THEM?

Behavioral Objectives:

1. The student will be able to name, list, define, describe or identify animal tracks.
2. The student will be able to explain why the tracks of animals differ (rabbits vs. dog tracks).
3. The student will be able to interpret animal running habits by seeing the tracks.
4. The student will be able to point out the differences and likenesses.
5. The student will be able to make a pattern of man's tracks over a period of years.
6. The student will compare animal tracks which were studied. He will contrast, interpret, and explain them.
7. The student will be able to choose and identify three animals and describe at least two different tracks of each, i.e., footprints, droppings, browse or grazing clues.
8. The student will be able to report these findings in a manner which is comfortable to him. Oral, written or bulletin boards.
9. The student will be able to differentiate and describe each.
10. The student will be able to organize his findings and identify each by a value or value complex.
11. The student will be able to report and answer questions of teachers or peers.
12. The student will be able to cast animal tracks on his own when conducting further experiments. It is hoped that students will be able to take this skill on family outings in the summer.

Directions to the teacher:

Guide students in research to motivate positive attitudes toward animals, their habits and their habitats. Make plaster casts of handprints. If students can mix own plaster of paris and cast own handprints in classroom they will become proficient and will be able to do so on outings.

On field trips to Eco-Lab find and identify animal tracks. Look for weasel, cottontail, jack rabbit, squirrel, dog, duck, cat, snake, field mouse, shrew, muskrat, turtle, frog, toad, blue heron, sparrow, blackbird, robin, meadow lark, lark bunting, horned lark, magpie.

Direct students in making plaster casts of animal tracks. (See Attachment)

Directions to the students:

Make plaster cast of animal tracks which you find.

Materials:

Tweezers; shellac spray bottle (pressurized spray can); several two inch wide strips of 18 inch cardboard or tin; heavy paper clips or clamps; at least two cups of plaster of paris; tin can or plastic bowl, Vaseline; and India ink.

Comments:

This activity lends itself to many disciplines.

Language: research and reports (verbal, pictures, written).

Art: The casting, and reports, bulletin boards.

Science: research of animal life.

Third graders may wish to write to the Hawaii State Health Department for information concerning the death of the coral in the ocean off the islands due to water pollution.

How to make a plaster cast:

Clean track of loose particles of soil, twigs, leaves or other debris. Spray track with shellac or plastic from pressurized can if available. Form two inch wide strip of cardboard or tin into a ring surrounding the track. Press firmly into ground to give support, but allow at least one inch to form edge of mold for plastic.

Mix about two cups of plaster of paris in a tin can or plastic bowl, adding water slowly until it is about to the top. Pour plaster into the track. Allow it to harden at least fifteen minutes before lifting out. If soil is damp, hardening may take longer.

When cast is hardened, lift cast out, remove ring, and clean the cast by scraping with a knife blade and washing.

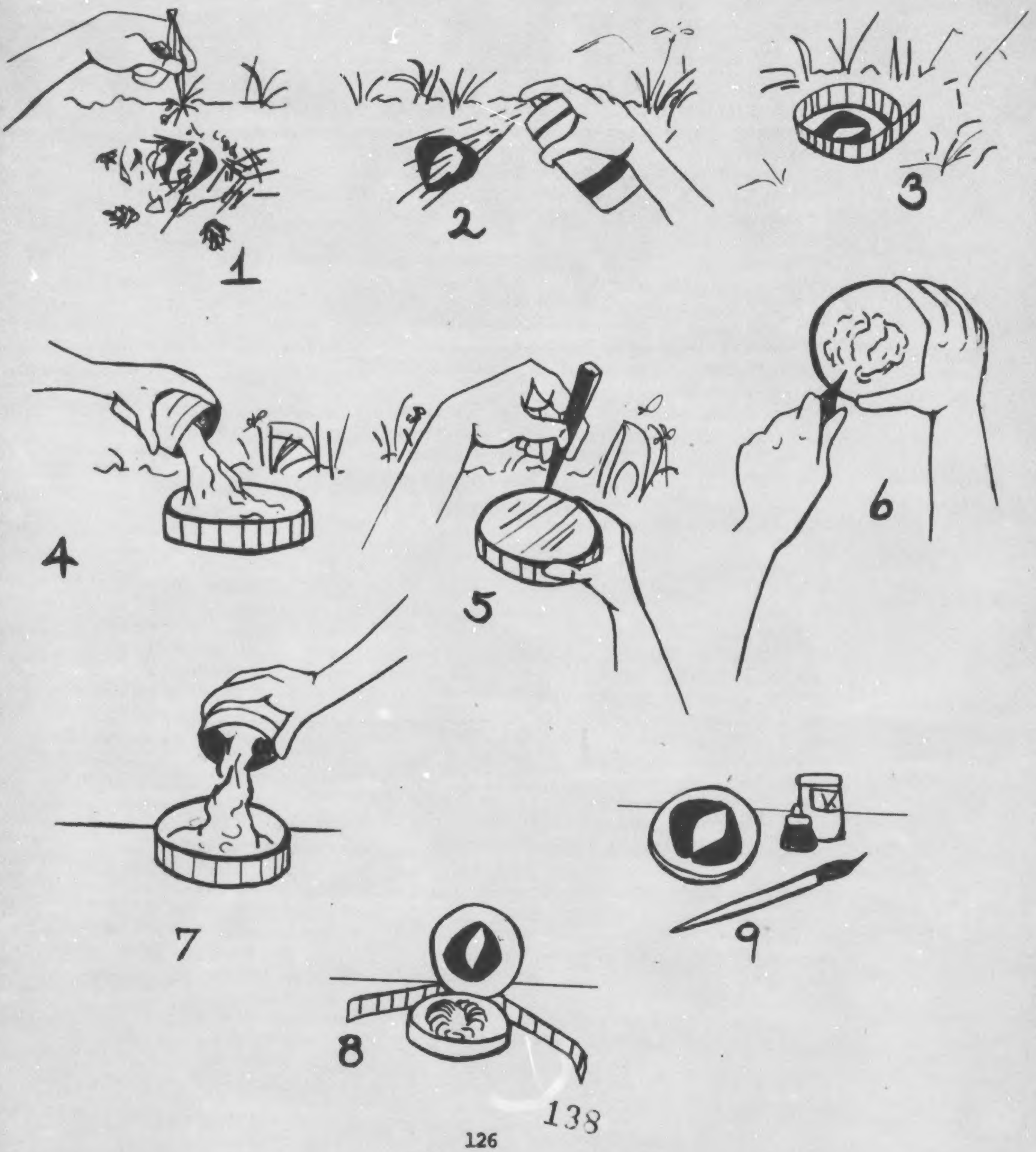
Apply thin coat of Vaseline to track and surface cast. Place on flat surface and surround casting with a two inch strip of cardboard or tin as before.

Mix plaster of paris and put into mold, making certain that the top of the casting surface is smooth and level with the mold. If you want to hang the plaque, attach a wire loop in back while the plaster is still soft. Allow at least two hours for plaster to set.

When plaster is dry, carefully remove mold, separate the layers and wipe excess Vaseline from face of cast and track. Smooth with fine sandpaper if needed, use knife to scrape the rough places and then wash in running water.

After cast has thoroughly dried use India ink or tempera to paint inside of track. Label. If desired, you may spray with clear shellac or clear plastic.

How to Cast Animal Tracks



Primary Submitted by Rose Tensley

OBSERVING A MAMMAL

Behavioral Objectives:

1. The student will be able to select three characteristics of mammals from a list of five characteristics.
2. The student will be able to distinguish between five mammals and five non-mammals when given a list of ten animals.
3. The student will be able to match the baby mammals with their mothers when given a list of ten mother and ten baby mammals.
4. The student will be able to arrange the names of ten mammals in three categories of plant eaters, meat eaters, and plant and meat eaters.
5. The student will be able to tell two ways in which mammals are conserved.
6. The student will be able to state one way in which the protection of wildlife is important to the State of Wyoming.
7. The student will be able to propose a way to protect a wild animal which is present in Wyoming.
8. The student will be able to satisfactorily take care of the feeding of an animal pet in the classroom.

Directions to the teacher:

The teacher can have a mammal (Gerbil) available in the classroom so that the students can make their own discoveries.

Reinforcement will be needed by making available other observations, such as going on field trips, seeing movies, filmstrips, and having books available for the students.

The teacher might suggest to the students the following things to find out. Are mammals large or small? Where do they live? What do they eat, and how do they get their food? Are the young of mammals born alive? Do mammals protect themselves? Are mammals useful to man? Do we try to conserve our mammals?

It is much better for the teacher to make a list of the things the students discover without any suggestions.

Directions to the students:

Choose a pet mammal that can be kept in the classroom, and have students discover as much as they can about physical characteristics, food, home,growth, care and learn of other wild animals.

List characteristics of mammals: mammals are born; mammals nurse; mammals have fur or hair; and mammals have warm blood.

Have students make a collage from pictures brought from home. Collect pictures of animals and their homes. Have a matching game on the board or on a dittoed sheet where students need to match the name of the animal with the place where they live. Example: lion--jungle.

List foods mammals eat: plants, meat, both plants and meat.

Have students make a chart and put animal pictures on the chart according to their eating habits. Name and collect pictures of mother animals and their young. Have a list of animals and baby animals for the students to match.

List the different ways we take care of pets: feeding, handling and training. The students should take turns taking care of the pet in the classroom. They can read stories and books that show how the mother animal protects her young. List ways in which our wild animals are conserved and protected.

Have an employee of the Game and Fish Department come and talk to the students, and also show movies on how the wildlife in Wyoming is protected.

Other Activities:

Have a pet show. Visit a zoo or pet shop. Paint and draw pictures of mammals. Model clay animals. Make silhouettes of mammals. Make a scrapbook. Write stories. Collect poems and stories. Have a program by using puppets or acting as animals. Games (unscramble animal names) Listen to records of animal sounds.

Materials:

Pet with cage and all the equipment. Pet food. Other food to experiment.

Film and filmstrips available:

Animals in Spring (color)	MP 3
Bear Country	MP 86
Farm Babies and Their Mothers	MP 13
Mammals Are Interesting	MP 21
Our Vanishing Wildlife	MP 260
Animal Differences	FS 1H67
Animals of the Zoo	FS A23
Animals to Know	FS 1H69
Animals and People	FS 1J55
Finding Out How Animals Live	FS 1H1
Plant Eaters and Bears	FS 1H69
Wild Animals at Home	FS I12

Books:

Dean Humphreys, Animals Every Child Should Know, Gosset and Dunlap, New York, 1961.

Tony Pallazzo, Animal Babies, Doubleday & Co. Garden City, N.Y., 1960

Illa Padenforf, The True Book of Animal Babies, Childrens Press, Chicago, Ill., 1955 and 1960.
Terry Shannon, Where Animals Live, Albert Whitman & Co., Chicago, Ill., 1958.

Primary Submitted by Erma Whitmore

EARTHWORMS AND SOIL IMPROVEMENT

Behavioral Objectives:

1. The student will be able to identify changes in texture of soil brought about by the presence of worms.
2. The student will be able to distinguish between loose and packed soil.
3. The student will be able to relate plant cultivation to earthworm activity.
4. The student will be able to recognize the need for earthworms to assist in deep-down plant cultivation.
5. The student will be able to identify the value of earthworm activity to plant growth.
6. The student will be able to compare growth of plants in soil in which earthworms have been placed with that in which there are none, and be able to relate cultivation by earthworms to improved plant growth.
7. The student will be interested in protecting earthworms by opposing use of pesticides and by building up soil by adding organic materials in his own environment (yard, flower beds, gardens).
8. The student will voluntarily do research on the life cycle and habitat of earthworms, to find out ideal conditions for their growth and development.

Concepts:

To help children investigate, observe, and become aware of the important role the earthworm plays in plant growth.

Directions to the teacher:

Have students bring two wide-mouthed jars, some dark soil containing leaf mold, some sandy soil, and some earthworms.

Directions to the students:

Make three layers of soil in each jar, A and B, using a layer of dark, light, then dark, or vice versa. Then put earthworms on top of jar A.

How can you make the earthworms feel at home? (wrap dark paper around the jar) In a few days remove the dark paper. What do you observe? In which jar is the soil thoroughly mixed?

Materials:

Jars, dark paper, earthworms, soil (two kinds), beans and research on commercial worm farms, or food for the earthworm.

Comments:

A good follow-up might be to plant beans in each jar. Water thoroughly, but equally and observe the growth.

Intermediate Submitted by Leslie Bateman

SEEDS

Behavioral Objectives:

1. The student will be able to describe plants and seeds with some degree of accuracy. (Description might include size, color of various parts, numbers and kinds of parts, method of seed dispersion if evident).
2. The student will be able to, through research, identify how seeds travel. (Number and kind of seeds to be identified is at the discretion of the student and the teacher.)
3. The student will be able to predict outcomes of the experiments involving the effects of various kinds of stimuli on plant growth.
4. The student will be able to distinguish between dependent variables and independent variables in the experiments.
5. The student will be able to compile data from one or more of the plant experiments.
6. The student will be able to compare the growth of the various plants in the classroom with those growing naturally at the Eco-Lab.
7. The student will ask questions about the plants at the Eco-Lab when the class is visiting that facility.
8. The student will collect samples from plants represented on the Eco-Lab site.

Directions to the teacher:

This activity-group has been designed for the intermediate grades; however, with modification of the objectives and activities, it could be used most successfully with any of the elementary school grades or even the secondary school grades. The nature and variety of activities are designed with a view toward individualization, with students working singly or in small groups on activities of interest to the students. That the students remain interested and enjoy the scientific processes with which they are working is of more importance than the learning of specific detailed information about plants, seeds, etc.

It would be hoped that the following major concepts could be learned by a majority of the students:

Seeds are one of the plant kingdom's methods of reproduction.

Seeds travel via a variety of methods: (structure of the seed is often a very good clue to mode of travel) windblown, waterborn, animalborn, both internally and externally. Don't forget man is an animal.

Plants respond to a variety of stimuli: liquids, lights or their lack, temperatures, etc.
Plants are a part of the food chain at the Eco-Lab and everywhere else.

In general this unit is devised to provide for a fall or summer visit to the Eco-Lab to gather seeds and study plants. Winter activities in the classroom would include the various experiments with the variety of environmental conditions and stimuli and their effects on the plants which would be grown from the seeds gathered at the Eco-Lab.

In the spring or summer, a return visit to the Eco-Lab site would be made to study other stages in the plants' cycles in the natural environment and to compare results to classroom-grown plants with those grown naturally.

Because of the length of time required for plant grown in the classroom, plant activities may take one or more science periods each week and another science activity or unit be undertaken concurrently.

Directions to the students:

The following are but a few of the many activities you can do with plants. Each group of questions centers around a certain kind of activity. If you wish, get about fifty file cards and put one of these questions or groups of questions on the top of one side on the card.

Put these cards in a box where it will be handy for everyone. When you select a card and do the activities on it, you may wish to develop a way of keeping track of what you have learned.

If you would like, you could put your name or the names of those in your group on the back of the card after you have completed the activities on that card.

Others doing the same activities may want to compare notes with you as they go along or when they are done.

If you think of other activities to do or questions you'd like answered, put them on the top of blank cards and add them to your card box.

How does music affect plant growth? Does the type of music make a difference? Does the volume of the music make a difference?

Where do new plants come from? Where do seeds come from?

How does a fern reproduce?

How do seeds travel? Ways to investigate might include: by air, by water, being eaten by animals, by wind, by explosion, by attaching themselves to animals.

What are bulbs? Do plants with bulbs have seeds also.

What plants do you find on a field trip around your school? What plants did you discover growing at the Eco-Lab? Are they the same or different from those around your school or at the Eco-Lab?

Did any seeds attach themselves to your clothing as you walked around the school? Around the Eco-Lab? What kind of seeds are they? If you had taken a field trip in a different state or country, would different kinds of seeds attach themselves to your clothing?

How does the color of light affect plants' growth? What kind of plants will work best for this experiment? How can you use a colored transparent wrap in this experiment? What do scientists mean when they say "control group?" What kinds of things can you observe about the plants' growth patterns? Do leaves and stems look different? Could you use colored light bulbs instead of the transparent paper? What would happen if you grew one plant with no light or black light?

What kinds of seeds do you eat? What kinds do the animals in your classroom eat?

Do all animals eat seeds? If not, which ones don't? Why do you think this might be so?

How much moisture do plants need to germinate to grow? Does it vary with different kinds of plants? How could you find out?

How much time do seeds need to germinate? Does it vary from plant to plant? Does it vary within the kind of plant or just between kinds of plants?

Do big plants grow from big seeds and small plants from small seeds? If so, why do you think so? If not, give examples that indicate it is not true.

Do seeds have an upside-down and right-side up way to grow?

What will happen if you plant seeds that have been boiled? baked? frozen?

Are all plants green? If not, do the non-green ones have chlorophyll like green ones? Is chlorophyll always green? If not, give examples.

Do all plants need flowers? Do all plants have flowers? What are some of the kinds of flowers in your neighborhood? At the Eco-Lab?

How do plants respond to cold? Will they grow differently in the cold outside the classroom in the winter than inside the warm room? Why do you think this might be true or not true?

How strong are leaves? How strong are roots? How strong are stems? How can you find out? Are some plants stronger than others?

Do plants' roots all look the same? How does the length of the roots compare with the length of the stems and branches?

What does a large amount of water do to a plant? Why do you think so?

What kinds of plants grow on the bark of trees at the Eco-Lab? Which side of the trees do they grow on? Which kinds of trees do they seem to grow best on?

What happens to the leaves that fall from the plant in the fall?

How many different kinds of plants can you find in a square meter of ground at the Eco-Lab? Do your figures agree with those of your classmates? If not, why not?

What does a stem do? In what ways can food be stored in a plant?

What part of a plant is a potato? a tomato? a geranium ? an avocado?

How long can leaves live without air? Does it vary from plant to plant?

Materials:

Materials needed will vary with the activities selected by the students and the extent to which individuals and groups pursue various interests and delve into the experiments, even elaborating on them if desired. Use recycled materials as much as possible. The following are generalities concerning materials which may be needed:

A variety of reference materials -- on all reading levels from beginning to advanced (this is a MUST, that there be a wide variety of materials available, no matter what investigations the students wish to pursue)

A record player or cassette tape player (for music experiments, or perhaps some students will wish to tape their observations); variety of seeds collected at the Eco-Lab; variety of other kinds of seeds for use in experiments; bulbs from various types of plants; colored transparent wrap or colored light bulbs; potting soil, vermiculite, gravel, and pots (may use peat pots); various utensils, sticks, spoons, measuring devices, cups, string, tape, and typical classroom supplies, such as: paper, paper clips, staples, scissors, crayons, marking pens, etc.

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Intermediate Submitted by Michael Franko

WHAT DO CIGARETS DO TO YOU?

Behavioral Objectives:

1. The student will be able to identify cigaret tar as an organic substance in cigarets.
2. The student will be able to state three detrimental effects of cigaret tar on the human being's appearance.
3. The student will be able to predict that some cigaret tar remains in the lung tissue of a smoker of cigarets.
4. The student will be able to identify cigaret smoke as being made up of solid and gaseous parts.
5. The student will be able to predict that smoke from any burning substance will contain solid and gaseous parts.
6. The student will be able to contrast the habit of cigaret smoking with the habit of gum chewing on the criteria of: (a) cost per year (b) affects upon your health.
7. The student will be able to search for and present information related to the reasons people smoke.
8. The student will be able to complete the described experiment without help from the teacher.

Directions to the teacher:

Cigarets produce cigaret tar. Tar is made of several different organic chemical compounds many of which have been shown to be injurious to life. The brownish material appearing in the cotton in the tube is cigaret tar. Cigaret tar discolors teeth, fingers, clothes, and contributes to bad breath; and gets into the lungs. It is thought to be one contributing cause of cancer.

Concepts to be learned:

Cigarets produce cigaret tar. Smoking can become habitual. A habit is hard to break. Cigaret tar has a disagreeable odor and may stain objects with which it comes in contact.

Conceptual scheme:

There are biological roots to behavior.

Discussion questions:

What do you think of smoking? Is smoking a habit? If so, what is a habit? Why is it difficult to give up smoking once you start? What do cigarets butts smell like? Calculate how much money it takes to smoke one pack of cigarets a week, a month, a year. How much would it cost a person who smokes three packs a day for a year? What is cigaret tar? What does it look like? How would you go about obtaining some cigaret tar in the classroom?

Materials:

One cigaret for each student; several books of matches; medicine dropper for each student; cotton (enough for each student).

Directions to the students:

In your discussion you were asked: What is cigaret tar? What does it look like? How would you go about obtaining some in the classroom?

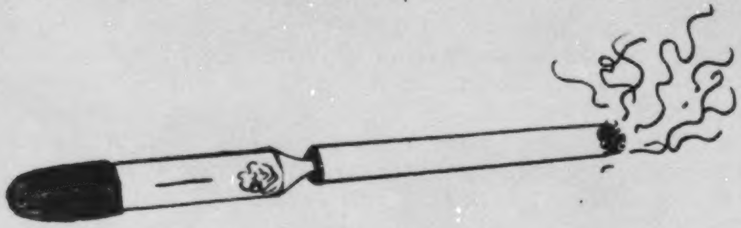
Here is an experiment that might help you answer these questions.

Take off the rubber end of the eye dropper. Place a small amount of loosely packed cotton in the small end of the glass tube. Now replace the rubber bulb on the end of the glass tube.

Now stick the point end of the glass tube into the end of a cigaret that a person puts in his mouth.

Light the other end of the cigaret so that it burns well.

Now pinch the rubber bulb of the "pipette" several times.



Write down what you see. What is happening in the dropper? What is happening to the cigaret? What about the cotton? Anything else? Open a window or turn on a fan. Now, take off the rubber bulb and smell the cotton. What does it smell like? How about the inside of the glass tube? What do you think the cotton has collected?

Have you answered the questions? If not, keep trying.

References:

R.B. Sund, B.W. Tillery, R.W. Throwbridge, Elementary Discovery Lessons, The Biological Sciences, Allyn and Bacon, Inc. Mass, pg. 273-274
Wyoming Tuberculosis and Respiratory Disease Association, Box 1128, 415 East Pershing Blvd., Cheyenne, WY 82001.

Intermediate Submitted by Nancy Miller

SLOAN'S LAKE IN OUR ENVIRONMENT

Behavioral Objectives:

1. The student will be able to cite at least three ways in which Sloan's Lake is used by the community.
2. The student will be able to give three examples of the values of Sloan's Lake to the community.
3. The student will be able to collect, label and bring two examples of pollution of the lake environment to the classroom.
4. The student will be able to identify at least three sources of pollution of the lake environment.
5. The student will be able to create a poster, picture, or letter to the media which will make the general public more aware of the value of the lake to the community.
6. The student will be able to state which of three sources of pollution to the lake is the most difficult to control.
7. The student will be able to suggest ways to make the public more aware of the aesthetic values of the lake.
8. The student will be able to display evidence of pollution to the lake and its environment.

Directions to the teacher:

Plan this unit as a late spring activity (as the lake is in optimum condition at this time of year and can be compared to its condition at the end of summer).

Arrange for resource persons with the community to talk with the students about the lake. For example: representatives from City Park Department, State Game and Fish, City Police, U. S. Coast Guard (they help with the patrol and safety work at the lake), and City Water Department.

Plan trips to any of the above listed places if this activity seems more valuable than having resource persons visit the classroom.

Plan a visit to the lake to survey the area and collect evidences of pollution and evidence of uses of the lake.

Collect research materials for classroom use, such as books and audio-visual materials (a suggested list will be attached to this unit proposal). Arrange for a display table to hold pollution evidence, such as glass jars to contain materials like water polluted with motor oil and many examples of trash found in and around the lake area. Prepare bulletin board space for the students to prepare a map of the Sloan's Lake area. Collect art supplies for the bulletin board and posters and pictures to depict ideas and findings of the students.

Suggest ideas for written and oral reports to be made by students. Plan a picnic culminating activity for this unit during which students can review what has been learned about Sloan's Lake in our environment.

Directions to the students:

Find out why and how Sloan's Lake was created. Investigate the uses of this lake and its value to the community. Make oral and/or written reports on pertinent data concerned with this unit of study. Collect, label and bring samples of pollution materials found in and near the lake.

Plan and make a bulletin board map of Sloan's Lake and the surrounding area of use. Make posters and pictures of activities people do in the lake area and pictures of pollution problems. Try to learn how people can help reduce pollution in and around this lake. Investigate ways in which students can make members of this community more aware of the value of this area and the dangers of increased pollution. Publicize information in news media and in other classrooms within the school and the school district.

Materials:

Paper, poster and art supplies are available within any school. Research materials will be collected largely by the teacher for use within the classroom. A display table will be brought into the classroom. A. V. materials can be ordered as needed. Glass jars and small boxes can be collected by the teacher and students to be used to contain pollution.

Audio-Visual Supplies:

The following list is available from the Instructional Materials Center at Central High School.

Life in Ponds, Lakes & Streams (color)	FS D51
Soil and Water Conservation	FS 1J76
Water for Tomorrow	Kit 173
Water Cycle	TR 314
Water and Life	FS 1J65
Fresh Water Turtles and Fish (color)	FS C17
Small Fresh Water Animals and Insects	FS G36
Squandered Resources	Kit 167
Water for Tomorrow	Kit 175

Comments:

This unit has been written to be used for intermediate grades--4th, 5th, and 6th. However, this unit has been used in 2nd grade successfully without going into as much research.

Intermediate Submitted by Erma Parkins

SUCCESSION OF ANIMALS FROM DEAD TREE THROUGH ROTTING LOG TO SOIL

Behavioral Objectives:

1. The student will be able to list some of the animals found in rotting logs.
2. The student will be able to summarize the effects of animals on dead trees and logs.
3. The student will be able to predict what will happen to other dead trees and logs in the forest.
4. The student will be able to illustrate the various stages of decomposition of dead trees.
5. The student will be able to tell or write the effect of animals on dead trees and logs.
6. The student will be able to conclude that animals help decompose dead trees.
7. The student will be able to share with others the importance of animals in returning dead trees to soil.

Directions to the teacher:

Arrange to take your class on a field trip to the woods or an area where there are dead trees and fallen and rotting logs. Take along several magnifying glasses and have each student take a notebook for drawing and writing observations.

Divide the students into several small groups with an adult with each group. Take time before the trip to go over the objectives and explain the trip to the other adults.

Look for dead trees and fallen logs in various stages of decay. Examine the trunks of trees and the fallen logs for animals and signs of animals (example: grubs under bark, woodpecker holes, ants, termites, and holes made by animals that will let air and water into the log.) Have them write down or draw what they see.

Have the students speculate, ask "What do you think killed the tree?" Ask questions such as--"What kind of animals can you find?" "How many insects can you find?" "What size are they?" "What color?" Make pictures of them. "What are they doing?" "Are they eating?" "What?" "Why?"

Move things aside or have a student move things to see if any small creatures are underneath. Replace everything as you found it.

Ask, "Are there any signs of larger animals?"

When the class is finished with their observations, discuss the meaning of interaction and interdependence. (Interaction--at least two things acting upon one another.) Example: lichens clinging to rock and producing acids that over the years change the rock to soil. Interdependence--at least two things depending on one another. It is interaction plus mutual dependence. Example: Some plants depend on bees to pollinate them and bees depend on plants for their nectar.

Then ask "Did you observe any interaction of interdependence today? If you did, give examples of it."

As a conclusion ask "How long do you think this forest has been here? How many trees that have grown here do you think have died? Do you see that many lying around? Where are they? Why isn't the forest heaped high with dead trees?"

Directions to the students:

You are to stay with the group to which you are assigned. Do not wander off. With your group you are to look for dead trees and fallen logs that are decaying. Look for animals and signs of animals on these trees and logs. See if you can discover what effect these animals have on them. Use the magnifying glasses.

Use your notebooks to write descriptions, observations, or draw pictures of what you see. If you have any questions, ask the leader of your group or write them in your notebook for later discussion.

If you move any parts of the logs you are examining, replace them as you found them.

Materials:

Magnifying glasses, notebooks, pencils and crayons (if desired).

References:

Filmstrip: What is Soil? FS G37
Motion Picture: Partnerships Among Plants and Animals MP230
Transparencies: Decay of a Log (Soil Building) TR 307
Book: Bertha Morris, The Golden Treasury of Natural History, Simon and Schuster, Inc., New York, N.Y., 1952.

Intermediate Submitted by Thaddaus Wagner

OUR RESOURCES

Behavioral Objectives:

1. The student will be able to identify forestry terms (such as clear-cutting, seedling, sapling, pulpwood, raw timber, etc.) by use of a chart and definition of each.
2. The student will be able to give examples of how trees help make our lives more pleasant. Explain how the forest environment provides a spot for recreation, rest and relaxation during the calendar year to man.
3. The student will be able to relate how trees help in the community and prepare a chart showing the foods and important products obtained from trees.
4. The student will be able to point out, by thinking and talking, what individuals can do and what a group can do to care for trees in the community.
5. The student will be able to compile and summarize the interrelationships of forests, wild life, water and recreation.
6. The student will be able to conclude that forests like other natural resources must be used wisely and for the good of all the people.
7. The student will be able to defend his conclusions and try to verify them by presentation from materials he has acquired.

Directions to the teacher:

Make provisions for students to talk together in groups to make preparations for a panel discussion. Encourage them to use forestry terms which have been defined. Arrange to have a forester visit the class to discuss "How Forests Affect Our Lives." Arrange to have the addresses of state agencies and lumber industries for students to seek suitable materials on forests.

Have U.S. maps available such as: land use, natural vegetation of U.S., rainfall, relief, and political. Make provisions for a field trip to a tree nursery or agricultural station. Arrange for a seedling for each student.

Directions to the students:

Make a collection of actual items made from trees. Make a collection of advertised wood products. Write letters to appropriate federal or state agencies and industries for suitable materials on forests. Make a scrapbook for class or for yourself with wood cover.

Use state map to show or list trees native to state. Make observations and take notes during visits to forests and during field trips.

Materials:

Maps:
Land use, natural vegetation of U. S., rainfall, relief and political map of U.S., and map of the state.
Reference books on trees, tree products, forest and life materials.
Construction paper for the various displays of products and charts.
Films:

The Forest	U.S.F.S.
From Trees to Lumber	A.F.I.
From Trees to Paper	A.F.I

Pamphlets

"Products of American Forests"	U.S.F.S.
"It's a Tree Country"	A.F.P.I.
"Growth of a Tree"	A.F.P.I.

Resource Persons:
Forester, State Forestry Agency or U.S.F.S.

Comments:

This unit can apply itself to either 4, 5, or 6th grade with little modification. The intent is to make the student think of the forest as though it is his own.

Intermediate Submitted by Ruth Wilson

AIR, SOIL, AND WATER POLLUTION

Behavioral Objectives.

1. The student will be able to identify one way in which the lives of men are affected by: (a) air pollution (b) soil pollution (c) water pollution.
2. The student will be able to state one example of each of air, soil, and water pollution.
3. The student will be able to cite evidence of each of the three types of pollution found in his own environment.
4. The student will be able to identify one source of air, soil, and water pollution in his own environment.
5. The student will be able to explain three ways in which each of the three forms of pollution upsets the balance of nature.
6. The student will be able to describe one way pollution of air, soil, or water could be reduced.
7. The student will be able to list evidence of air, soil, and water pollution in the school environment.
8. The student will be able to accurately record the results of one of the four experiments described.

Concept:

If man upsets the balance of nature, it will affect his very existence.

Directions to the teacher:

This study encompasses air, soil and water pollution. It may be taught at one time, dividing the class into thirds to each take one topic OR it can be done one at a time. Permission should be obtained from parents before filtering systems are set up. The length of the study can be lengthened by using extended activities.

Directions to the students:

Pollution of the environment destroys those elements essential to the life of man and those things upon which he is dependent. Care of our outdoors is important to preserve natural beauty in the world. If man upsets the balance of nature, plant and animal communities are altered and sometimes destroyed.

Introductory Activities:

List several examples of man upsetting the balance of nature. (nature area) Describe ways that man pollutes the air, water, and soil. Provide a description of one way man might use to reduce pollution.

Air:

Investigate various accessible filtering systems, and record observations relating to their construction and efficiency. Some suggestions are air conditioners, humidifiers, cigarets, dryers, range exhausts and automobile filters.

Experiment to make understandings of observations. A piece of loosely woven cheese cloth could be tied around the end of an exhaust pipe. Observations could be recorded of different types of gasoline emissions and/or automobiles. During the winter months when the air conditioner is not in use, controlled intake and exhaust experiments might be performed to see if internal air is less or more pure than external. Cotton and synthetic materials could be machine dried separately to determine which type of cloth produced more air-borne particles.

A fan device could be constructed to test air contaminants inside and outside the home over specified periods of time.

"note" In any experiments, variables should be controlled to a maximum degree so that results can be compared.

Extended Activities:

Does your community have air pollution control ordinances? (city, state) Do industrial users of coal and oil control devices for smoke and gases? What are local regulations on burning trash? How can the operator of an automobile find out how he can improve the quality of the air.

Soil:

Plant several of the same kind of plants in the same kind of soil. Use different insecticides, fertilizers, and detergent "liquid" on plants to determine harmful effects of each. Learn about contour plowing. Invite soil conservationist to speak to class. Set up soil testing center. (Kit may be purchased at garden supply store or write to: La Motte Chemical Products Co., Educational Products Division, Chestertown, Maryland 21620. Cost may be shared by collecting small contribution from each. Model E. L. Soil Test Kit, Code #5679 is $9.95.)

Extended Activities:

Construct a terrarium containing plants, animals (lizards, toads, etc.), and insects to feed animals. Observe community life. Make and observe an ant community. Cover all around with dark cloth and look inside once a day. Observe tunnels. Provide crumbs and a few drops of water.

Discover examples of soil erosion and causes of that erosion. Compare the depth of topsoil at different locations and drainage patterns. Explore the economic value of wild plants. Discuss why their use in our yards might be an advantage: use of water, soil, climate necessity of sprays, etc.

Water:

Place Elodea plants in each of six containers. Fill one 2/3 full with water and the others the same fullness, but with varying amounts and types of detergents. Observe over a period of several days. Determine the phosphate content of leading brands of detergents.

Work up a local water budget. (income, outgo, and storage.) Learn about sewage facilities in your community. Equally divide a variety of wet organic and inorganic substances into tightly sealed jars and into jars which allow some air into them. The substance may be items such as paper, cloth, plastic, metal pieces, bread, coffee grounds, etc. These should be observed until decay becomes obvious in several jars containing organic material.

Extended Activities:

Get report from city utilities on water use in the city. Report on irrigation activities. Report on use of water in community: industrial, farming, etc.

"note" Field trips can be taken.

To wild life area to observe natural plants, animals, etc. Sewage plants. Water storage areas. Nature trails or public parks to observe man's changes and man's pollution. To local streams to observe flow, pollution, plant life, etc.

Materials:

Air:

Filtering systems, cheese cloth, various types of materials, and fan.

Soil:

Plants, insecticides, fertilizers, and detergents, soil test kit, terrarium (plants, lizards, insects), and an ant community.

Water:

Elodea plants, detergents, jars and organic and inorganic materials.

Comments:

Many related activities are available in other subject areas.

Language arts: Vocabulary study of words related to the environment and conservation. Write a theme describing an environmental experience - the beauty of the outdoors. the abuse of nature by man. Hai-ku poetry expressing an experience in nature. Creative writing - life in 25 years at this rate.

Art: Pencil and charcoal sketches of plants and animals common to locale. Arrangements of dried grasses and other plants.

Music: Sounds and ballads based on outdoor experiences. Observe natural rhythms and sounds in nature. Compose and chart a sound composition.

If field trips are taken follow this rule: Take nothing but pictures, leave nothing but footprints.

References:

Northern Colorado Outdoor Nature Center, Environmental Curriculum Guide, Howard D. Bruner, Editor-Director, Arthur J. Wilcox, Associate Director.

Environmental Education Project-Activity Booklet, Dr. Howard Bruner, Richard G. Paul.

Tragedy in the Laundromat - 1970, Minnesota Environmental Sciences Foundation, Inc.

Intermediate Submitted by Charles Zumo

TESTING OF SOIL AT ECO-LAB

Behavioral Objectives:

1. The student will be able to define the soil types.
2. The student will be able to give two examples of soil differences.
3. The student will be able to state why some types of soil will hold water better than others.
4. The student will be able to distinguish between the different soil types.
5. The student will be able to analyze for the mineral content of soil.
6. The student will be able to determine what can be done to soils to improve them.
7. The student will develop skills in sampling soil for analysis.
8. The student will sample and analyze soil.

Directions to the teacher:

Define soil, mineral content, pH. List minerals that are found in soil and needed for plants. Demonstrate how to sample soil, analyze for mineral content, and techniques for obtaining pH values. Discuss use of fertilizers on soils and how these affect plants.

Directions to the students:

Get containers for soil samples. Get soil samples from various areas. (1-6 inch level and 6-12 inch and 12-24 inch depth.) Record the types of plants growing in each sampling area. Analyze soil for mineral content. Analyze soil for pH values.

Materials:

Films on soils, recent periodicals on subject, and soil sampling kits.

Follow up:

Use different methods to try to change composition of soil in several places. a) use commercial fertilizers, b) use animal fertilizers c) use plants (as) mulch, etc. These activities can be followed up several times a year and observed.

Special Education Submitted by Dorothy Ketchmark

KANGAROO AS A MEDIA OF TEACHING

Behavioral Objectives:

1. The student will be able to define and spell other words which mean pollution.
2. The student will be able to use spelling words in short sentences.
3. The student will be able to describe pollution he has observed using terms which mean pollution.
4. The student will be able to identify "litter" in the school building and its environment.
5. The student will be able to identify "pollution" he has observed outside of the school environment.
6. The student will be able to tell how he could help to combat pollution when he is traveling in other parts of the state and nation.
7. The student will be able to name three ways in which he would help others to combat pollution.
8. The student will be able to collect and deposit litter he has observed in the school building and/or school yard.
9. The student will be able to grow molds on a blood agar plate using dust from the room, dirt from outside, chalk dust or pencil sawdust.

Concepts:

The main objective is to give students the understanding of how they can have a better and cleaner school -- inside as well as outside.

Help them understand why they want a clean classroom, school building, and grounds. Help them realize it is also their duty to keep the halls, library, auditorium, lunchroom, schoolroom and A.V. rooms free from litter. Help them become aware of the litter which surrounds their school building; instill in them a willingness to improve these conditions. Help them to understand they are a part of their community, state, and nation; and it is their duty to help take care of "trash" no matter where they may see it.

Directions to the teacher:

Use Quickie Kangaroo posters and booklets as a media or incentive to learn about pollution and ways they can help "Quickie" to keep their environment clean. This will be correlated in all areas of academic study using posters, booklets, books, etc. to be listed in materials.

Directions to the students:

Use the papier mache kangaroo as well as litter bags of kangroo to clean up all trash inside, outside of the school building. Use the kangaroo bulletin board in the room for small trash in the schoolroom.

Materials:

Posters of "Quickie" ecology booklets of "Quickie" spelling words in back of booklet, dittos of vowel sounds, blends, readiness kangaroos, ditto kangaroo for art; ditto kangaroo numbers-draw dot to dot; books from the library; coordinator of art to help make papier mache kangaroo (cluster teacher); bulletin board kangaroo with pouch for litter (this could include ABC, or numbers or social studies, etc.); Observe dust, chalk dust, pencil sawdust under microscope, grow molds on blood agar plate using dust from room, dirt from outside, chalk dust, pencil sawdust.

Comments:

Use both sides of paper in writing daily lessons. Use wet rag in cleaning chalk dust from ledges of chalk board. Art teacher makes frame of wire for large kangaroo. Field trip around school to pick up litter-use large kangaroo of papier mache and litter bags to pick up trash. Inside and outside.

Do collage of litter collected--include pencil shavings. Try to find a kangaroo skin for touch texture, etc. Some teachers who have been to Australia have purses. Social studies class on Australia. Use globe to find the country and also the globe to find the oceans. (Ocean is a spelling word in booklet.)

References:

Books

Jon Nita Jons, Wild Wooly Animal Book, Random House, Inc., 1961.

Patricia K. Miller, Joey Kangaroo, Holt, 1963.

Encyclopedias

Comptons Pictured Encyclopedia and Fact, Index
(a) Volume I (Australia) pages 710-737.

The World Book Encyclopedia, Field Enterprises Education Corp., Chicago, Ill., 1971, pages 870-903.

Magazines

National Geographic (Australia) Vol. 124, No. 3, September 1963, pages 309-411.

National Geographic (New South Wales the State that Cradled Australia,)Vol 132, No. 5, November 1967, pages 591-637.

National Geographic (The Alice in Australia's Wonderland) Vol. 129, No. 2, February 1966. Pages 230-361.

National Geographic (Sports-minded Melbourne:) (Host to Olympics) pages 688-693.

National Geographic (New Book) Australia, Space, Vanishing Peoples and Africa's Wildlife) pages 844-849.

National Geographic (Queensland) Vol. 134, No. 5, November 1968, pages 593-640.

National Geographic (The Making of a New Australia) Vol. C.I.X., No. 2, pages 233-260.

National Geographic (On Australia's Coral Ramparts) Vol. C.X.I., No. 1, January 1957, pages 1-48.

National Geographic (Lyrebird Australia's Meistersinger) Vol. CVII, No. 6, June 1965, pages 849-858.

Films

Continents and Oceans FS K-35, Audio-Visual Catalog, School District Number One, Cheyenne, Wyoming, 1971, page 71.

Guides, Bulletin Boards, Posters

Language Arts for Teachers of Special Education Classes, Cheyenne, Wyoming, September 1963, pages 25-28, Price $1.75.

Teacher-made bulletin boards in room of kangaroo for litter.

Posters of Kangaroo Kit in School Library, Ecology Laboratory.

Dittos

Jenn's, No. 1-539, 1-682, R3978, R250, R254, R280. Self-made by teacher (enclosed copies). Scott Foresman and Co., 1966, No. 6 Identify rhymes.

Connect the Dots

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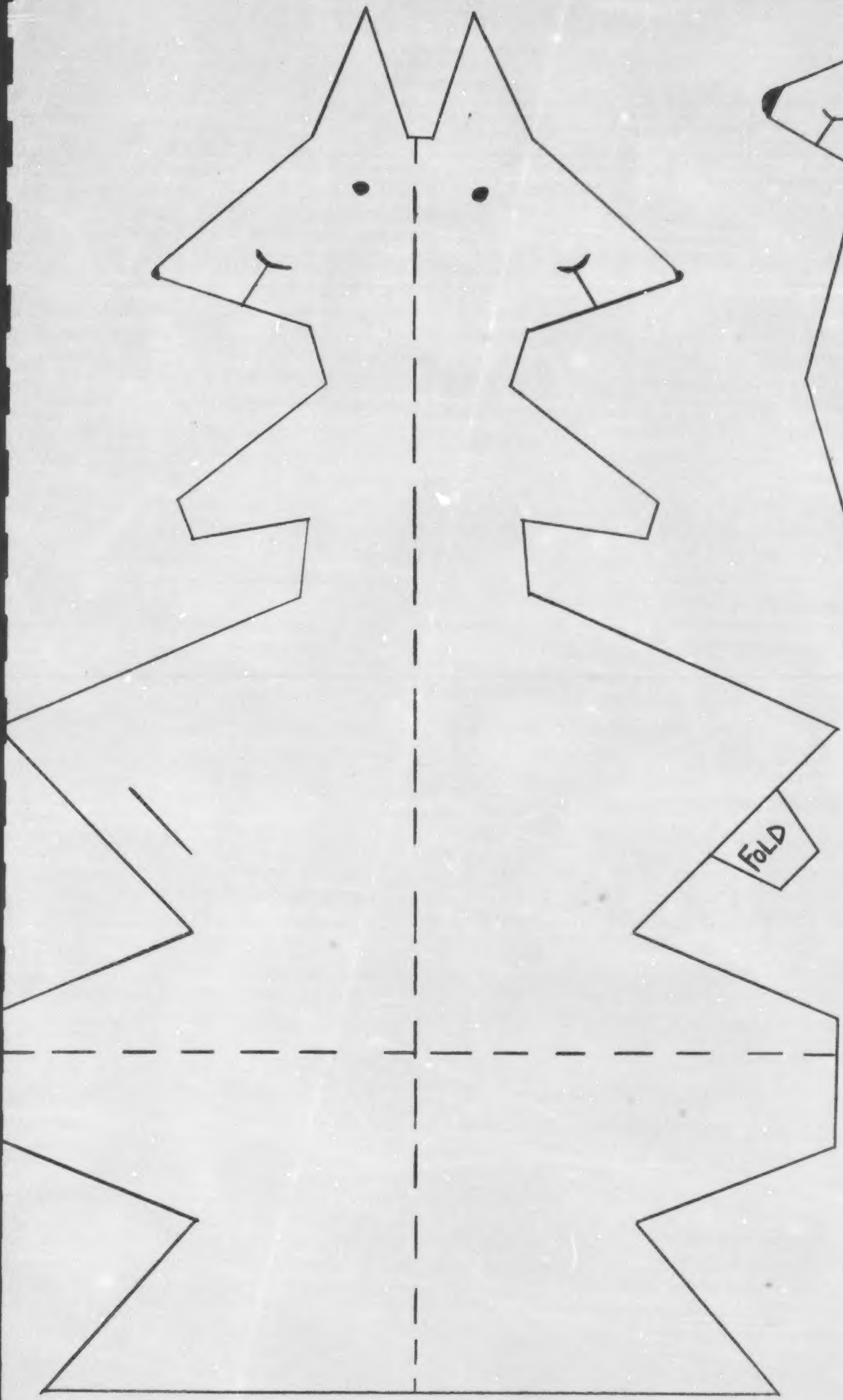
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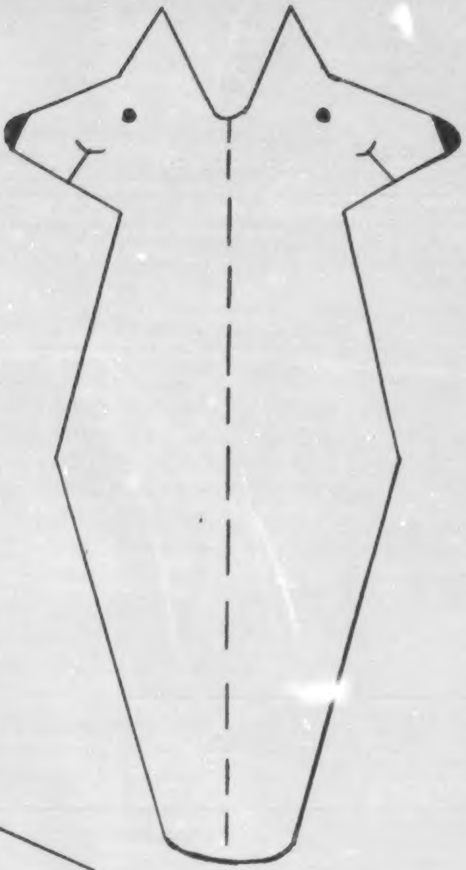


Multi-level Submitted by Thelma Ball

OBSERVATION AND IDENTIFICATION OF TWELVE WYOMING TREES AND WILDFLOWERS

Behavioral Objectives:

1. The student will be able to describe at least five trees (primary) and five wildflowers (primary) of the Rocky Mountain area. More may be required for older students.
2. The student will be able to distinguish between needled trees (conifers) and broad-leaved trees (deciduous) when presented with pictures of both.
3. The student will be able to predict which trees and flowers would be prickly to handle and which would be smooth when presented with pictures or specimens of both.
4. The student will be able to draw the main parts of a tree and flower.
5. The student will be able to arrange the trees (cards) into categories such as useful and ornamental.
6. The student will be able to compare one tree with another when working with the cards.
7. The student will display an interest in planting of trees and wildflowers at the Eco-Lab when presented with them, and will display a curiosity to know more about them.
8. The student, when on a field trip to the Eco-Lab, will gather specimens of leaves, bark, berries, cones, blossoms of the various trees and flowers.

Directions to the Teacher:

Present the student with the cards and explain various ways he can use them - observation, comparison, usefulness, recognition. Give an explanation of the differences between coniferous and deciduous trees, using pictures, filmstrips, films and activity cards.

Have a lesson on the parts of trees and flowers, depth depending on grade level. Present a lesson, using the information on the backs of the activity cards, on the usefulness of various woods.

Take the students on a field trip to the Eco-Lab (or to the Capitol grounds) to look at plantings of trees and flowers.

Directions to the students:

Examine the sets of tree and flower cards, noting the various characteristics of the trees and flowers. Separate the tree cards into conifers and deciduous categories, noting the differences. Handle samples of needles and broadleaves, describe the different feelings (prickly-smooth). Make drawings of trees and flowers, labeling the parts. (Difficulty according to grade level.)

Study the back of the tree cards to learn whether the wood is useful or merely decorative. Make comparisons between flower cards, noting ways they are alike and different. Make comparisons between tree cards, noting ways they are alike and different.

While on a field trip to the Eco-Lab, try to identify various trees that have been studied. Gather samples of needles, leaves, berries, cones, bark. Try to identify various flowers that have been studied. Gather samples of flowers to be dried and pressed.

Make a scrapbook of tree pictures with samples and descriptions. Make a scrapbook of flower pictures with samples and descriptions.

Materials:

Activity Cards - trees and flowers - that are included with this activity. Supplementary books, films, filmstrips on Wyoming trees and flowers.

Comments:

This activity could be used in a larger unit on Wyoming.

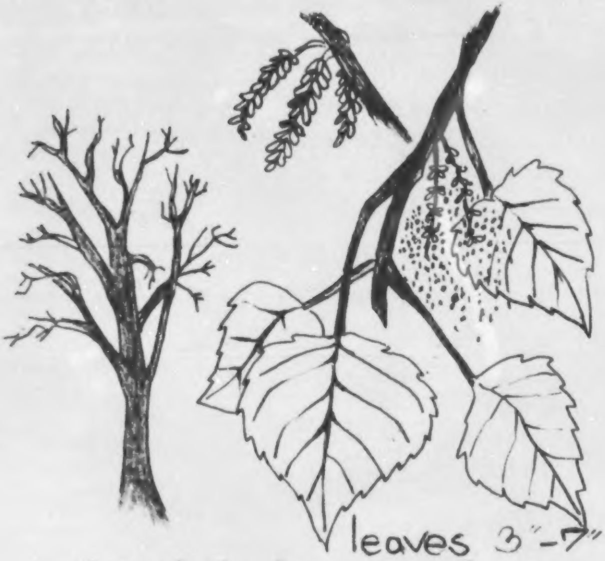
MAKE IT YOURSELF CARDS:

The following pages may be used to make your own set of cards.

Cut out pictures and mount on cardboard.

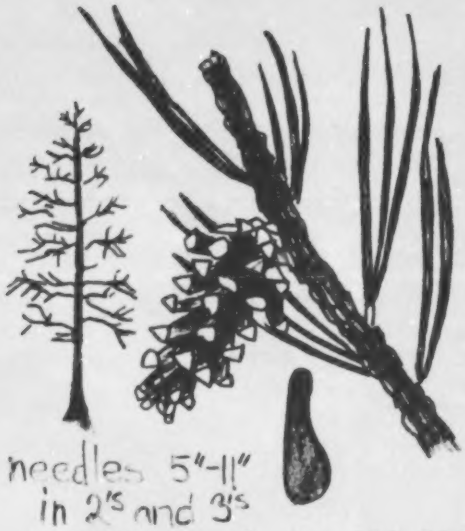
Information below each picture is to be pasted on the back of the card.

Cottonwood



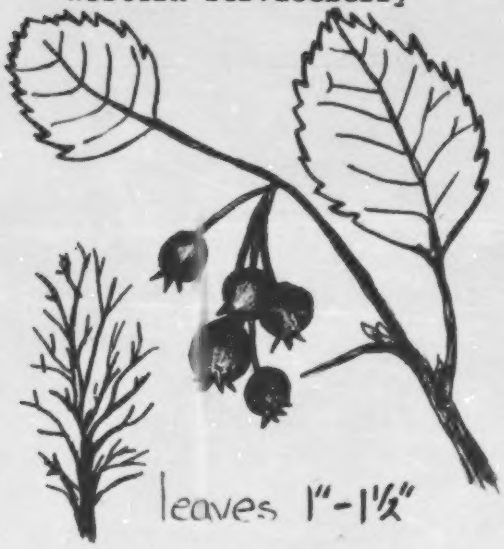
One of the largest poplar.
Light and soft.
Used for household wooden ware,
boxes, paper pulp.

Western Yellow Pine


needles 5"-11"
in 2s and 3s

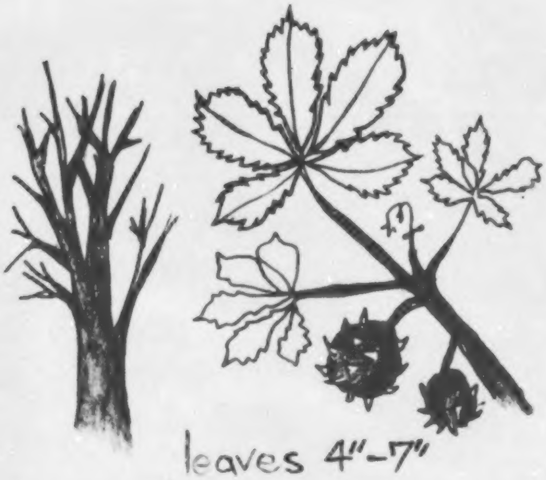
Trees reach age 350-500. Reddish yellow in color. Used for general construction and trim.

Western Serviceberry



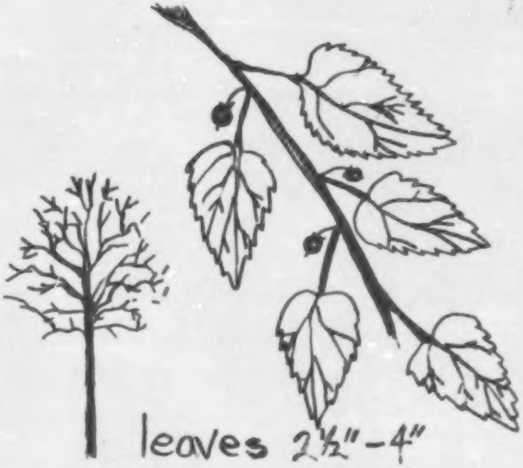
Usually a shrub, sometimes a tree 25' - 30'. Fruit is blueblack and edible

Horse Chestnut



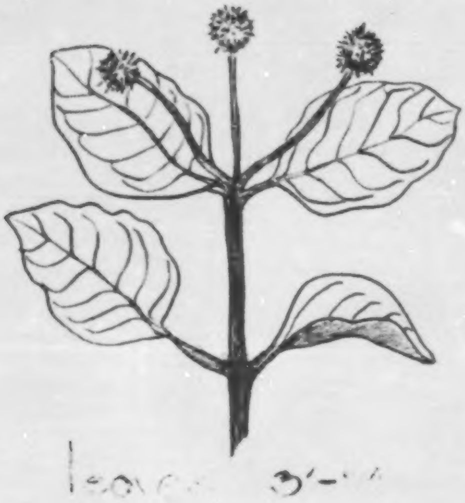
Native from Greece to Himalayas Mts. Wood used by European wood carvers and turners.

Hackberry



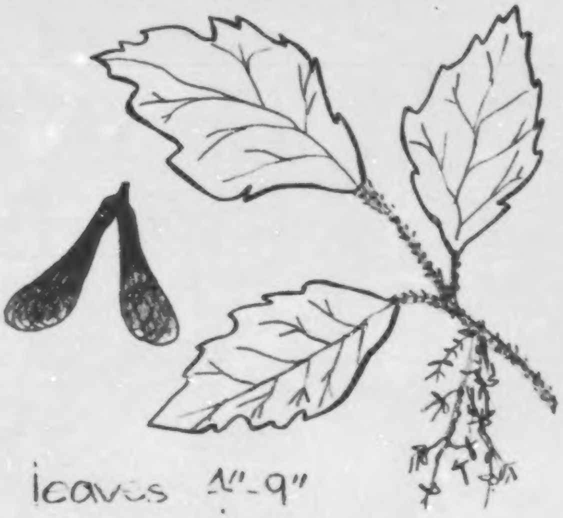
Cherry-life fruit-edible. Heavy wood. Some commercial value for rough lumber.

Button Willow or Button Bush



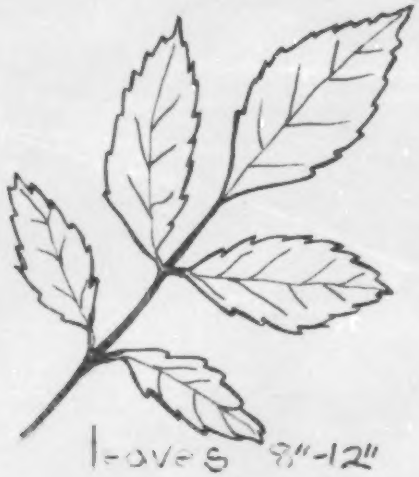
Borders sluggish streams, venturing into the water. Bark rich in tannin and has some medicinal properties.

Boxelder or Ash-leaved Maple



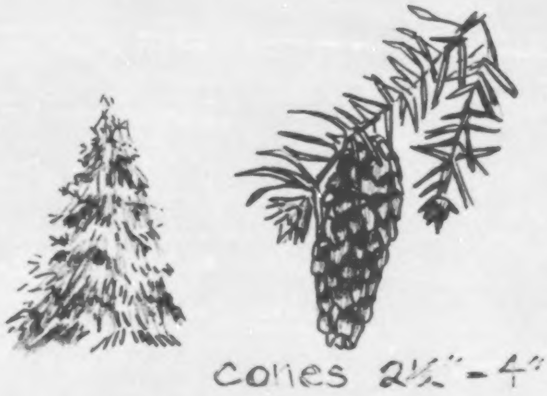
Sap can be made into sugar. Wood used for furniture, barrels and paper pulp.

Green Ash



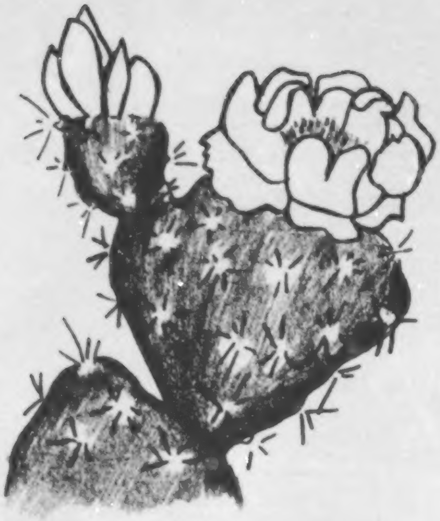
Leaf and twigs very smooth. Has much commercial value as wood is strong.

Colorado Blue Spruce



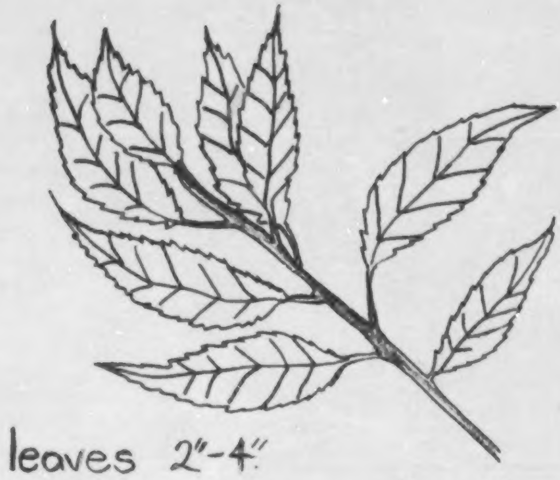
Silver and blue color. Softwood ornamental. Used for musical sounding boards.

Cactus Prickly Pear



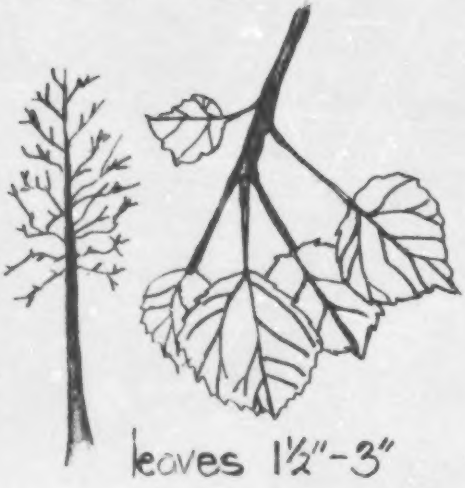
Spines are really modified leaves. Flowers 3" or 4" across.

Peachleaf Willow



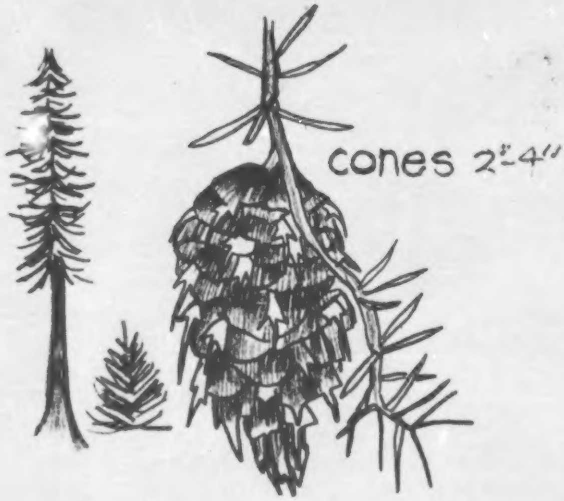
Only willow tree native to Wyoming. Found along streams and bottom land. Of little value

Quaking Aspen



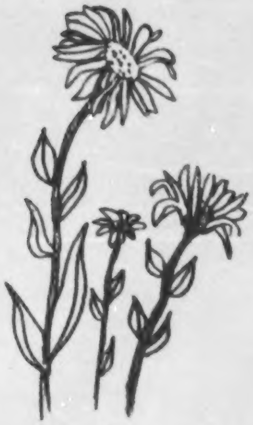
Very thin leaves. Moved easily by breeze. Used to make paper pulp and excelsior.

Douglas Fir



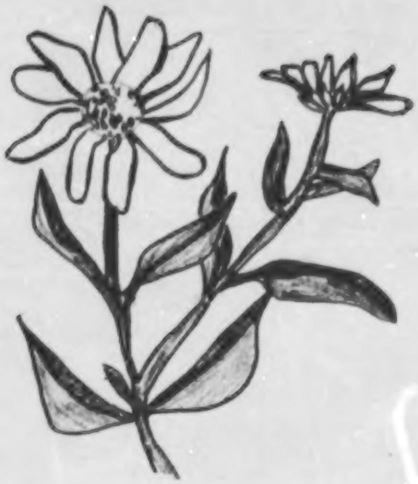
Yellow wood. Used for ties and pilings, construction and interior finish.

Mountain Daisy



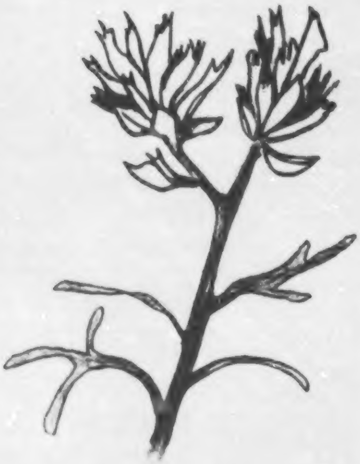
10" to 18" tall with heads from 1" to 2" across. Rays are purple or violet and disks are bright orange-yellow

Sunflower



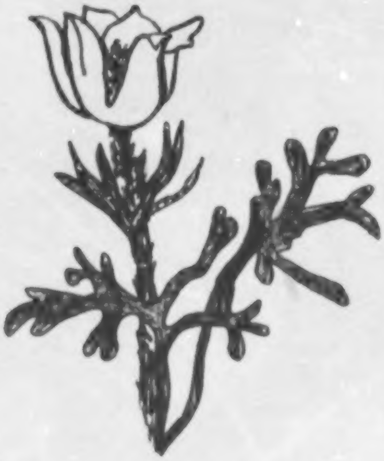
Bushy plant, much branched with stiff stems and rough-hairy leaves. Flower heads about 1" to 2" across.

Indian Paintbrush



State flower of Wyoming. Has scarlet brush

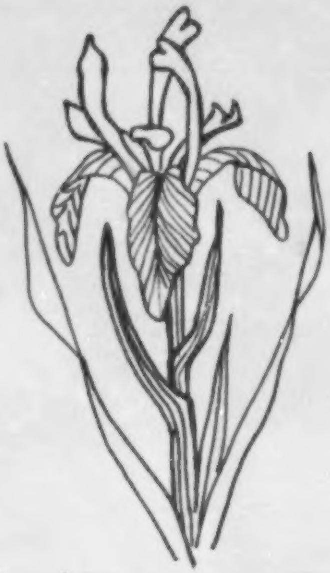
Pasque Flower



Gold-centered, purple or lavender cup. Silvery hairs.

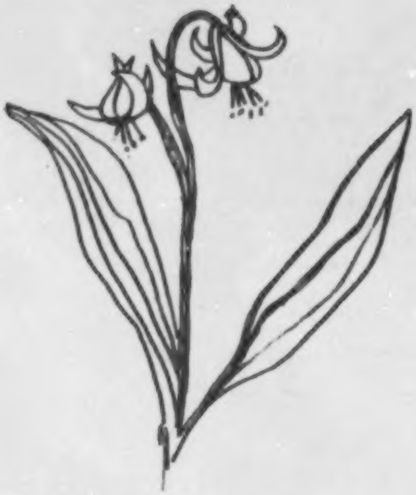
174

Wild Iris, Blue Flag



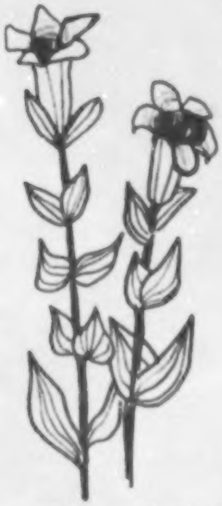
Flowers vary in color from pale to medium blue. Slender narrow petals

Snow Lily



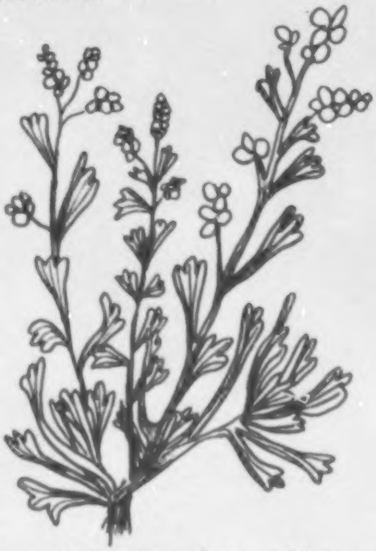
Six narrow, pointed yellow petals curving backwards. Also called dogtooth violets, although not related to violets

Blue Gentian



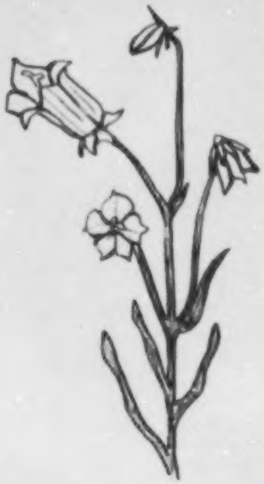
Bright Blue, funnel-form flowers. Stems are from 10" to 18" tall.

Sagebrush



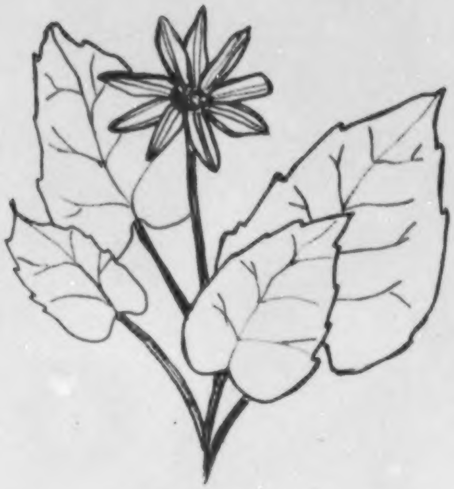
Common shrub with silvery green foliage. Wedge-shaped leaves.

Harebell or Bluebell



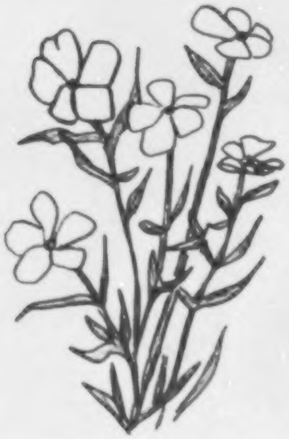
Dainty plant with slender, erect stems and drooping, bell-shaped blue flowers.

Arnica



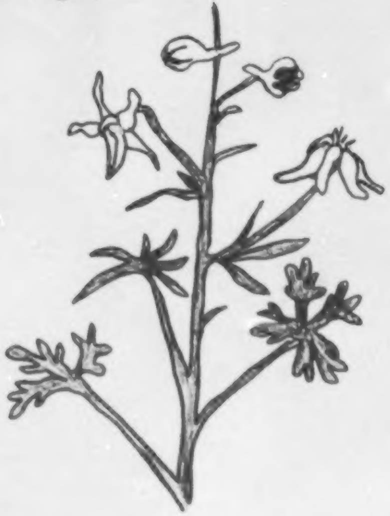
Large yellow heads (2" to 3" across). Stems about a foot tall.

Phlox



Five, spreading lobes-white or light blue, sometimes pinkish. Stiff pointed leaves

Larkspur



Single stem - brilliant blue flowers. Poisonous to stock 1' to 2' tall.

Multi-level　　　　　　　　　　Submitted by Jessie Easton

DEVELOPMENT OF GROUNDS OF DAVIS SCHOOL SITE

Behavioral Objectives:

1. The student will be able to do various tests on rocks and identify them.
2. The student will be able to gather produce from a vegetable garden, and utilize; be able to classify it by type; and know what won't grow in local growing season.
3. The student will be able to take a square of land to analyze and discover most types of life, plant and animal, and understand interrelationships.
4. The student will be able to make scale drawings of the school area.
5. The student will be able to keep a diary of vegetable growth and chart successes or failures.
6. The student will be able to evaluate successes or failures of certain species; describe and interpret changes due to plantings, fences, rocks, ponds or streams.
7. The student will be able to assist in soil preparation and planting, help with maintenance and harvesting.
8. The student will be able to influence his family to plant around the home site, and practice conservation. Pride in school property (feels ownership) will help eliminate pollution there and elsewhere.
9. The student will be able to present some ideas for varied usage of site, during brainstorming sessions, for possible activities, actual physical preparation.

These objectives would all help in accomplishing our goal of preparing children to adapt to the responsibilities of adult life in our society, and an appreciation of man's place in the natural world by living in harmony with the environment.

Directions to the teacher:

Great use can be made of outdoor laboratory and an extension of all curriculum areas indoors. Actual observations and experiments can be made.

Language arts: experience charts, poems, short stories, outlines and graphs.
Social studies: by association, explain adaptation of people, civilization.
Music: songs inspired by outdoors or some particular thing.
Art: visual pictures for painting.
Science: weather phenomena; soil types, influences of wind, weather, soil, climate; communities, interrelationships; rock study; species of plants; care of pets.

Materials:

Many materials can be improvised from scrap of inexpensive materials. Some can be built by adults for nominal sums, others might be donated. These can be kept simple or become more complex depending on the desired activities. Additions can be made year after year as funds and manpower are available. Additions should have a definite purpose and be such that maintenance can be kept to a minimum.

Comments:

The Davis School site presently offers much in the way of improvement. The school is set on a large rectangle of ground bounded on the west by the Yellowstone Highway, on the north by Montclair Drive, an unimproved road seldom maintained. This road has been graded ten feet higher than the school building, leaving the building lower than surrounding terrain and causing water to stand along the north side after snow melt and rain. A steep bank north of the building has been sodded, and an area west of the school toward the highway is grassed and some evergreens have been planted in the lawn area.

A parking lot on the southwest affords access to the front of the building and defines the playground on the west. In back a crescent shaped steep sloping driveway provides access to back of the building for delivery trucks, and stairs from the sidewalk along the north provides access for walkers. Between the stairway and the driveway is a low area, often with standing water. The playground is enclosed on south, east, and partly on the north with a high chain link fence.

Playground equipment includes basketball standards, tether ball poles, two cross bars, several rods, concrete sections to crawl through, and an old car body. Sand is periodically added to the immediate area of building. Natural vegetation has been graded and scraped off leaving hard, impermeable, sterile soil.

The purposes of this project are many and interrelated. The most obvious one is to beautify the grounds and enhance the fine structure which we have. The play area is large enough to put to varied purposes and should be much better utilized.

It is envisioned that this project must be planned to cover a period of years for these reasons:

period of time for plants to grow
limited amount of funds available in any one year
limited amount of time available from volunteers and experts
desirability of involvement of children in successive years

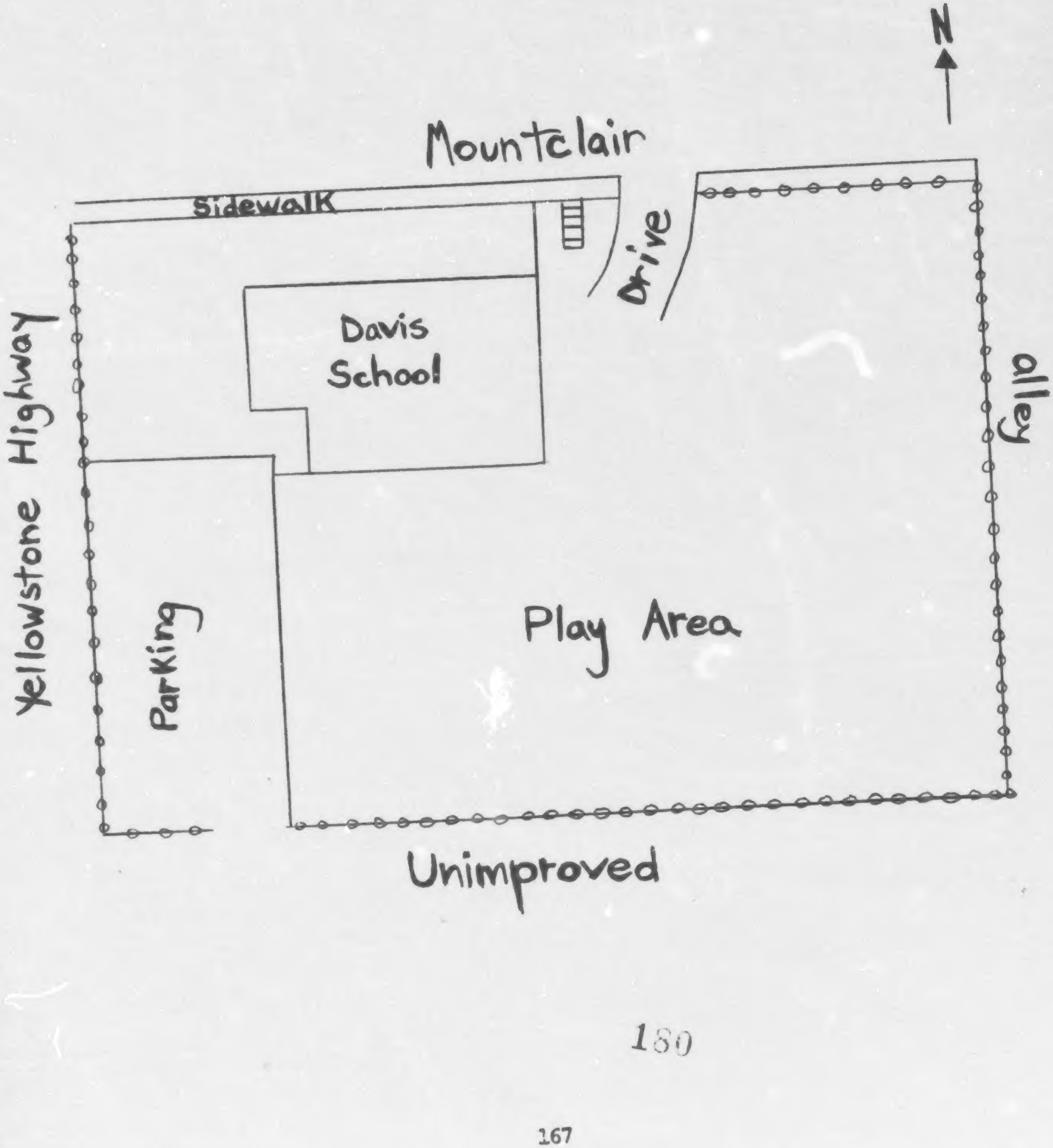
A master plan which can be implemented year by year must be worked out to avoid duplication of effort and error.

Improvements could be very simple or quite involved, depending on available resources and enthusiasm of the school community, but must serve a specific purpose, while contributing to the total overall plan.

For the present the plan should be kept quite simple. The work that is done should involve little custodial maintenance by using plants and practices suitable to this area of strong winds, dry winters, short summers, and little moisture. Here the services of the high school FFA, the Soil Conservation Service, the County Agent, and State Department of Agriculture would be called upon especially in the initial stages.

Total involvement of those groups who would be participating; children, their parents, other interested citizens and service groups, Davis School personnel, District Number One administrative personnel, must be accomplished by presentation of the plan, its purposes, possibilities, costs in terms of money and time, and benefits. Brain storming sessions for additional ideas and solutions, and development of ideas which will be attempted, must be held.

Other major purposes would include the benefit gained by working with all segments of the school community and working out real life problems. Students would also gain a general knowledge of conservation practices, climatic conditions, plant and animal life and other living communities. From this type of study they would get a general feeling of accomplishment, pride in improving something of their own, plus a general lessening of pollution.


N
Mountclair
Sidewalk
Drive
Davis School
Yellowstone Highway
alley
Parking
Play Area
Unimproved

Multi-level Submitted by Irene Forwood

AIR POLLUTION AND WEATHER

Behavioral Objectives:

1. The student will be able to list and define an air pollution glossary.
2. The student will be able to give examples of air pollution in our area.
3. The student will be able to demonstrate how all air contains pollution and/or dust particles.
4. The student will be able to illustrate the air cycle (using plants and animals).
5. The student will be able to organize experiments to measure air pollution.
6. The student will be able to explain reasons for eliminating air pollution for the survival of mankind.
7. The student will be motivated to choose environmental interests over self when decisions are to be made involving environmental implications. Not to smoke or ride a bike instead of using a car.
8. The student will locate sources of air pollution, report his findings, and modify his own behavior in an effort to help eliminate even a small part of air pollution.
9. The student may want to improve the environment by more walking, bike riding, and use of public transportation instead of being driven or driving everywhere. This in turn will eliminate a small amount of the pollutants coming from an exhaust pipe.

Directions to the teacher:

Assemble and assimilate all the information available on air pollution. Show films for developmental activities. Supervise the preparation of bulletin boards, table displays, and mount pictures. Coordinate activities in other subject areas by writing stories, conducting interviews.

Schedule resource personnel to give talks and show slides and/or films. Conduct field trips. Set up experiments for the students to discover solutions to environment problems, using techniques employed by other individuals and groups working on the same problems. Throughout the unit conduct a study of the weather suitable for any grade level. This could include: Daily recording of high and low temperatures, recording of sunset and sunrise times, calculating the minutes gained or lost of sunlight. Prepare a graph showing the high and low temperatures of a given city. Use two colors for this. By the use of an additional two colors the high and low temperatures of another city in a different climate could be graphed on the same chart. (Use the daily newspaper data.)

Appoint and supervise a weather committee to take daily temperature readings. Compare class findings with official data released daily in the local paper.

Directions to the students:

Each one will construct his own "Air Pollution" dictionary--consisting of 26 pages in alphabetical order, using the words in sentences, and illustrating if possible. Students will write up lab sheets on experiments. Each one will keep a picture folder and clippings.

Brain storming sessions will be conducted--what they can do to help combat the problem of air pollution. Conduct experiments in class, on school grounds, and at the Eco-Lab. Maintain daily weather data, make graphs, observations, etc.

Materials:

Magazines, newspapers, filmstrips, motion pictures, and books for resource materials. A functioning weather station at the Eco-Lab--to verify data gathered at school and U. S. Weather Bureau.

Paper and oak tag for individual dictionaries; lab sheets for experiments; Vaseline; cloth; tissue; cardboard, etc.; plants, vacuum cleaner; simple chemicals like vinegar and soda; thermometers, rain gauge, barometer, etc.

Concepts:

Clean Air Must be Maintianed by Man for His survival

- Composition of air.
- Pollution replaces oxygen.
  - Take 14-18 breaths per minute. Country air has 40,000 particles of dust, city air 70,000 particles.
- Essential to plant life.
  - Activities - plant experiments
- Uses to Man
  - Transportation
  - Air Pressure (vacuum, tires, etc.)

Weather:

The Eco-Lab could provide an operating weather station which would include devices for measuring temperature, humidity, barometric pressure, and wind velocity and direction.

Man-made problems, in this instance Air Pollution, which threaten the existence of all living things are the concern of all people. Even children can use democratic processes in solving these problems.

It is hoped that children will take a positive approach to the solution of air pollution, and that they will choose environmental interests over self when confronted with the problems. One of the basic goals is to develop an appreciation of the intricacy and delicacy of the ecological cycle.

Another is to develop an appreciation of the scientific methods used by individuals and groups in solving problems.

Multi-level Submitted by Michael Franko

A POND COMMUNITY

Behavioral Objectives:

1. The student will be able to define "habitat."
2. The student will be able to name two types of habitats.
3. The student will be able to show how a pond is a habitat in terms of the definition of the word.
4. The student will be able to subdivide life in a pond into at least five types.
5. The student will be able to explain how each of three types of life in a pond are dependent upon each other for existence.
6. The student will be able to describe one way in which man could upset the balance of life in a pond.
7. The student will be able to label all specimens collected from the pond.
8. The student will be able to diagram a pond as a community of living things including at least one stemming emergent, one rooted aquatic, one floating plant, one amphibian animal, one insect, one swimming animal and one land animal dependent upon the pond.

Directions to the teacher:

A chief objective for the young scientist would be to locate and classify the varied forms of life he encounters. He might well add a diagram or construct a cross section of the water area.

Such a project could well involve an effort to find the various forms depicted in the enclosed diagram. With a little effort on the part of the student, he could go far beyond forms shown in the diagram and fill in many members of the community indicating what he finds and where they live in relation to others. Perhaps a collection of pond animals and plants could be made and later classified.

Concepts to be learned:

All animals must live in a certain environment. Most animals and plants rely upon each other to live. Many animals can be classified by where they live. The pond is a little world for millions of plants and animals.

Conceptual scheme:

There is a relationship between an organism and its environment.

Discussion questions:

What is an animal? Is an insect an animal? What is a plant? Do plants and animals need each other? What is a habitat? Is a pond a special habitat? What can we expect to find in a pond?

Materials:

One good productive pond, large kitchen strainer, garden rake, bottles and jars of varied sizes and descriptions, note pads, boots or old gym shoes, and magnifying glass.

Cautions:

A pond is not a dangerous place, however, students should be cautioned about staying out of the water and being watchful of uninvited guests.

They should also be reminded to leave the pond as they found it.

Filmstrips and Kit:

Ecological Populations and Communities	SS 79
Water and Life	FS 1J65
Animal Classification	TR 512
Plant Classification	TR 513
Wild Birds	FS 19
Insects	FS D15
Environmental Crisis Series	Kit 170

Directions to the students:

In your discussion you were asked: What is a plant? What is an animal? What about insects? Define a habitat. What do you expect to find in a pond?

You will be taking a field trip to the local pond. Perhaps you can answer some of these questions better after your trip.

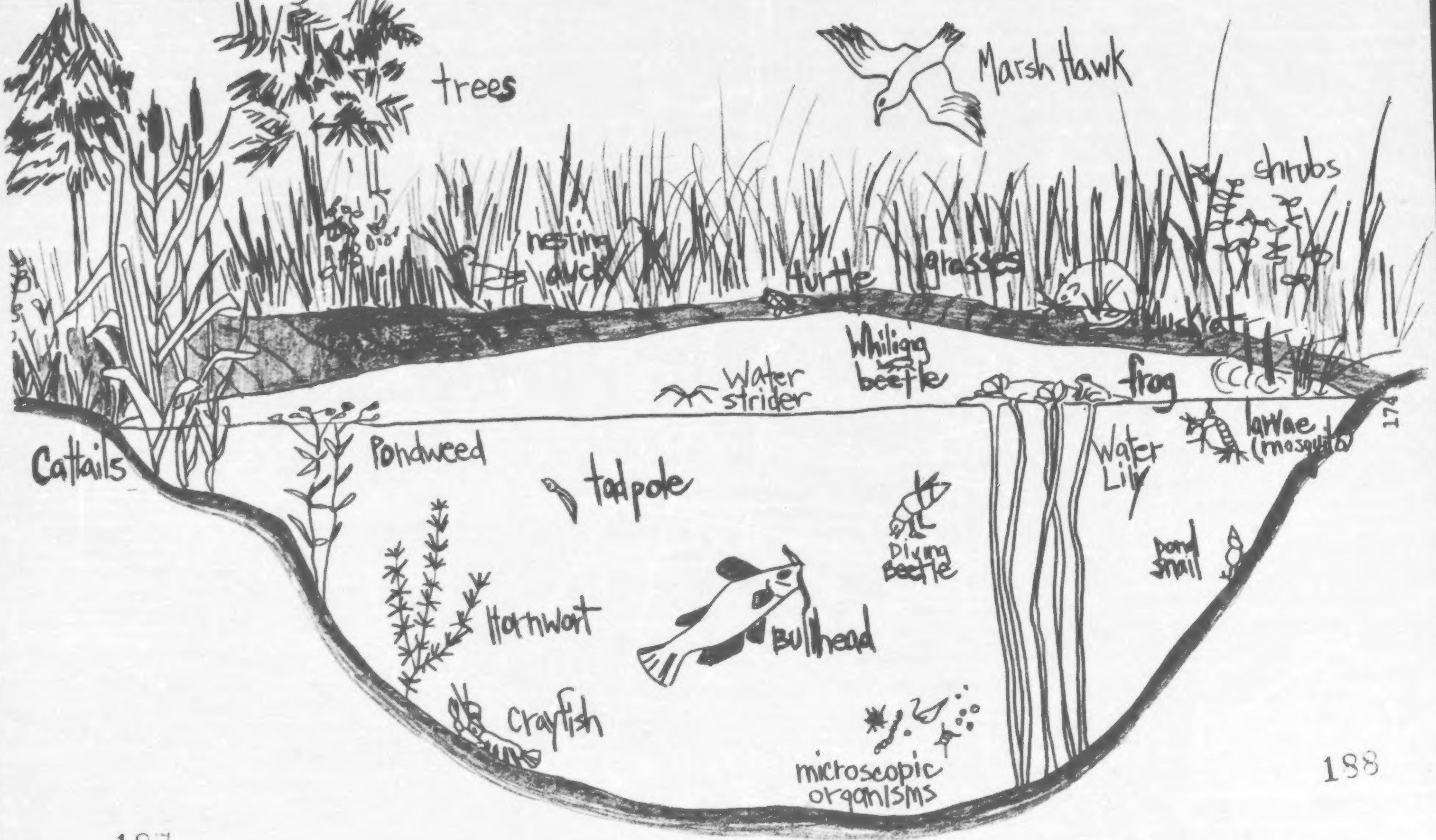
When you arrive at the pond you will be on your own. Suggested ideas for your investigation: Make a picture of what you see, perhaps like the one on the following page. After drawing your picture, you may want to start at one place and work your way around the pond. Record your observations on your drawing. If you find a special plant, animal, or insect, you may want to save a few for later classification. Take lots of notes, they will be helpful later on. You may want to take your rake and pull it across the bottom of the pond. See what you have discovered. With a net or kitchen strainer, see what kind of little things you can dip from the pond. Record what you discover. This is your day for observations. What else can you find or see?

References:

R. B. Sund, B. W. Tillery, L. W. Trowbridge, Elementary Discovery Lessons, The Biological Sciences, Allyn and Bacon, Inc., Massachusetts, 1970.

Western Publishing Company, Inc., The Pond Life, Golden Press Nature Guides, New York, 1956.

R. E. Brown, G. W. Mouser, Techniques for Teaching Conservation Education, Burgess Publishing Co., Minn. 1964


trees
Marsh Hawk
shrubs
nesting duck
turtle
grasses
Muskrat
Whiligig beetle
Water strider
frog
Cattails
Pondweed
tadpole
Water Lily
larvae (mosquito)
Diving Beetle
pond snail
Hornwort
Bullhead
crayfish
microscopic organisms

-NOT TO SCALE-

Multi-level Submitted by Michael Franko

ADAPT OR DIE

Behavioral Objectives:

1. The student will be able to define exoskeleton.
2. The student will be able to predict a way in which the crayfish would be affected during its molting period.
3. The student will be able to demonstrate two ways in which the exoskeleton of a crayfish is frustrated in its survival.
4. The student will be able to illustrate at least one way in which walking legs, claws and the tail of the crayfish are adapted to its dual life on land or in water.
5. The student will be able to compile three general types of adaptation any amphibian must possess in order to survive.
6. The student will be able to conclude which of two amphibians is better adapted to survival on the criteria of mobility, skeleton structure and food-getting capacities.
7. The student will be able to select at least one survival adaptation which is indicated in a picture of an animal that the student has not studied.
8. The student will be able to draw a crayfish accurately enough to answer the observation questions regarding anatomy.

Directions to the Teacher:

The crayfish is an invertebrate. This means it has neither skeleton nor backbone. The skeleton is exterior to the body and must be molted several times during growth. The crayfish is adapted to a water environment and can swim or walk on its legs or by flipping its tail. The tail action causes the crayfish to move backward in a gliding motion in the water.

Its color is such that it easily fades into the background of a stream or pond and therefore, it is not seen easily. Although crayfish breathe by gills, they can survive for a short time on land as long as their gills do not dry out. Crayfish eat both plant and animal food but prefer animal food. Crayfish eat food dead or alive. Partially spoiled food doesn't seem to bother them. Small pieces of fish meat or brine shrimp may be used to feed them in the laboratory.

Concepts to be learned:

All animals must adapt to their environment or die.

Crayfish must have an exoskeleton providing support and protection for their body parts. Crayfish have walking legs and claws which they use to walk on, obtain food with and defend themselves. They can swim in a backward motion with a flip of their tail. The crayfish's color helps to protect him from his enemies.

Conceptual scheme: There is a relationship between an organism and its environment.

Discussion questions: What does adapt mean? What is survival? What is an animal? Are we animals? Is man in a struggle to survive today? How is man in this struggle? What are crayfish? How can we learn survival from them? Where are they found? How do they breathe, eat, move? After this experiment, could we do a similar one on man?

Materials:

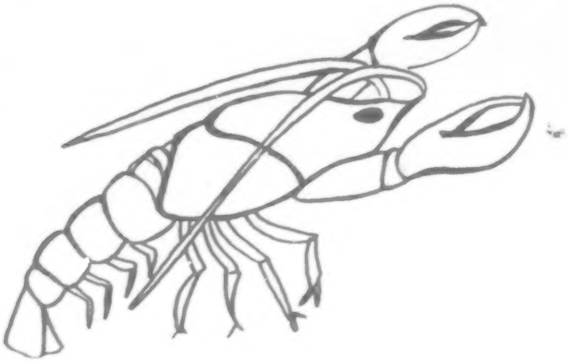
One crayfish for every four or five students. May be obtained from a local pond or stream. One pan (6" by 4" by 1" deep) for every four or five students.

Cautions: Crayfish have large claws, which can pinch. Crayfish are not the cleanest animals, and care should be taken to prevent disease.

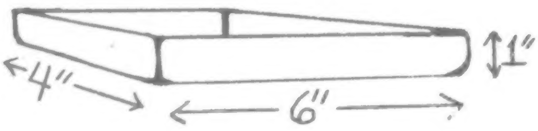
Directions to the students:

In your discussion you were asked: What does adapt mean? What does survive mean? What are crayfish? How do they adapt to survive?

Here's an experiment that might help you answer these questions and many more. Suggest you divide into groups of four or five before next step. OBTAIN THESE MATERIALS: (one person from each group)



A live crayfish



Pan with water

Suggested ideas for your investigation:

Now that your group has a live crayfish, place it in the water. On the second sheet is a place to record your observations. How many legs does it have? How do they vary? Do all the legs perform the same function? How does the animal protect itself against enemies? What kind of skeleton does it have? What do you think happens as the animal grows in the skeleton?

How does the color of the crayfish aid in its survival? If you were going to keep this crayfish in class, where would you place it and why? What do you think it will eat? Why? How does the crayfish breathe, eat, move? What does the crayfish do if you take it out of the water? Place it on its back and how does it react? What else do you find interesting? Perhaps a picture of the animal would be helpful...why not draw one?

Now that you are finished...do you think we could do a similar experiment on a man?

References:

R.B. Sund, B. W. Tillery, L. W. Trowbridge, Elementary Discovery Lessons, The Biological Sciences, Allyn and Bacon, Inc., Massachusetts, 1970, pg. 17-18.

The Danbury Press, The Illustrated Encyclopedia of the Animal Kingdom, Grolier Enterprises, Inc., New York, 1970.

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Multi-level Submitted by Jane Houston

MYSTERY ISLANDS

Behavioral Objectives:

1. The student will be able to describe his "island" and the objects found on it.
2. The student will be able to give examples (one of two for kindergarteners and first graders and three or four for second and third graders) of different classifications of objects found on his "island."
3. The student will be able to discover (one for kindergarteners and first graders and two for second and third graders) an object in each of the following categories-living, non-living, plant, animal and useful. Other categories may be added or substituted by the teacher.
4. The student will be able to point out at least one (K-1) or two (2-3) things that have happened here or that may happen in the future.
5. The student will be able to tell at least one (K-1) or two (2-3) instances of the interrelationship between objects on his "island."
6. The student will appraise his "island" in terms of its importance to plant and animals and cite two (K-1) or four (2-3) specific examples of this.
7. The student will be able to select and identify his "island."
8. The student will be able to discuss his "island" with others.
9. The student will be able to differentiate among various types of objects on his "island."
10. The student will be able to choose a Mystery Island and investigate it in relation to a number of pre-discussed attributes. He will use, competently, the appropriate materials and tools which are available.

Directions to the teacher:

Description of the project: Students will stake a "claim" approximately one yard square and investigate it to discover such things as: living and non-living objects, colors, smells, textures (feeling), noises, tastes, animals, insects, reptiles, spiders, plants, seeds, moisture at various levels, evidence of erosion, inter-dependence, ecosystems.

Follow-up activities will consolidate and reinforce knowledge gained. Suggestions for areas to investigate will depend on ages of students, the site selected and the ecological background of the participants.

Lead class discussion on Mystery Island before the actual activity takes place so that the students will understand the purposes of this activity and have an opportunity to talk over possible types of things for which to search.

Demonstrate or practice the way to stake a claim and how to mark it. Decide, with the group, how to record discoveries. Older students may want to write their own recordings. Discoveries could also be drawn, dictated to the teacher or gathered as "temporary captives." Discuss equipment and supplies needed and arrange for them to be at the site.

Arrange for permission forms from home, if they are needed. Be responsible for transportation, chaperones and collection of permission slips.

Upon arrival at the site, show the students where they will meet at the end of designated time. Supervise and assist as necessary with staking of claims. Encourage students and be sure they know the location of equipment and supplies. Signal the end of the time limits with a bell, a whistle or a holler and guide discussions and evaluations.

Guide follow-up evaluation and discussions and help students consolidate the knowledge they have gained through various methods as: exhibits; written or dictated stories or booklets; pictures and/or lists of findings.

Directions to the students:

If you think ahead to some of the possible treasures you might find on your island, you will be a better detective. Following the directions you have discussed, stake a claim to an island.

Explore your island. Look especially for the kind of things you have discussed with your teacher but look also for other things that interest you. Use a magnifying glass. Remember or record what you find. What do you find on your island that could be eaten by people? by animals? by insects?

Dig a hole several inches deep. What new things do you find? Can you tell anything that has happened on your island? Are there any homes on your island? Could you guess something that might happen in the next year on your island?

When you hear the signal, go quickly to the designated gathering spot. Take your equipment and supplies with you. If you have made any notes or pictures, take these too.

Help the group prepare a list, story, note book or exhibit demonstrating and classifying everyone's findings. You may want to prepare your own demonstration in addition to the group one.

Have a good time and see how much you can learn.

Materials:

Magnifiers for each one or two students; diggers of some sort--old spoons, forks, or sticks could be used; paper and pencil or crayons for those who need or want them; recording materials for the total group-chart paper, note books, it would be fun to use a tape recorder, too.

Comments:

Depending on the weather and facilities, evaluative discussions may be held outdoors on the site rather than in a classroom.

Several breaks for discussions and encouragement might lead to more productive investigations for very young students.

In some instances two students might stake a joint claim and work together on their investigations.

Encouraging the choise of islands with varying terrain or giving the students the opportunity to choose a second island at a later time, might make more discovering possible.

A bread of cookie crumb dropped on each island might attract some additonal form of life.

Correlation with math. How many things did you find? Which is the largest? Smallest? Measure your island. How many islands did we have all together?

Correlation with reading and language arts. Tell (or write) what you discovered. What does our chart say? What did you like best about your island? Read about the leaves (insects, rocks or worms, etc.) you found and tell the group.

Correlation with art. Certainly any chart, story, booklet or even light would be enhanced by illustrations. Drawing pads, crayons, paints, colored chalk, etc., could be included in the list of materials if time will permit on-the-spot illustrations. Cameras are fine things to have along too. Would someone like to make a clay model of an insect he found? Is there any clay on your island? Can you use it?

Correlation with music and literature. We don't sing too many sea chanteys in inland Wyoming, so going and coming from islands would be a good chance to introduce some of these delightful songs. Many of them have good rhythms for walking! There are, of course, innumerable songs, stories, and poems of animals, insects, spiders, plants, worms, etc. If you add the literature on islands, explorers, and detectives, the list would be almost overwhelming.

Correlation with social studies. The lot on which your home is built is your family's island. How do you take care of it? What recreational, educational, economic and aesthetic values does it have for you? To whom do parks, national forests, historical sites, museums, etc., belong? How are they valuable? If your island were in Florida, on the bottom of the ocean, at the North Pole or on the moon, in what ways would it be different?

Correlation with science. What is the difference between plants and animals? How do you tell insects from animals? Did you see different phases of plant growth? Why did plants grow or not grow in certain spots on your island? The list of possibilities for science correlation is nearly endless and limited only by the interests of those involved.

Ecological implications. What things helped plants and animals grow on your island? Which things should be left? If your island were a farm, or a city, or a ranch, how would you answer the above question? Is there some way you could improve your island. What kind of food did you find on your island for the animals and insects you discovered?

There is a multitude of movies, filmstrips, tapes, charts and books relating to this project.

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Multi-level Submitted by Sue Jackson

WHAT HAPPENS TO ROCKS?

Behavioral Objectives:

1. The student will be able to list four ways rocks become smaller and smoother.
2. The student will be able to explain the meanings of expansion and contraction.
3. The student will be able to discover that different kinds of rocks have distinct characteristics.
4. The student will be able to identify lichen.
5. The student will be able to explain how rocks have become weathered and eroded.
6. The student will be able to describe at least three different properties of two different rocks.

Directions to the teacher:

Plan with the students to bring different kinds of rocks to class. Have several students show one of their rocks and describe it. Display different rocks on a table. Have students read stories about rocks. Display some rocks covered with lichen. Prepare an art project having students make animals or paper weights with rocks.

Directions to the students:

Bring rocks to class. Arrange the rocks in groups according to their hardness. Pick up two rocks about the same size to see if they weigh the same. Show a rock and describe it. Wrap one rock in a cloth and break it. Tell if the inside of the rock looks the same as the outside. Examine the broken rock with a magnifying glass. Tell what is seen. Find out if several of the rocks dry at the same time after putting them in water.

Scratch one rock with another to find which is harder. Put several drops of vinegar on a piece of chalk. This shows what acids from lichen does to rocks.

Materials:

Stories about rocks, hardness chart, rocks (some with lichen), paint, glue, crayons, felt, chalk, vinegar, water, cloth, and hammer.

Multi-level Submitted by Wendy Jacobson

LEARNING FROM OUR WASTES

Behavioral Objectives:

1. The student will be able to define and describe by drawing or orally: Level One - Mold Garden; Level Two - Landfill; Level Three - Composting.
2. The student will be able to extend knowledge by constructing with a partner: mold garden, landfill, compost pile.
3. The student will be able to modify each project with one variable (add or delete).
4. The student will be able to identify changes in experiment by sketches.
5. The student will be able to explain either orally or written why he thinks changes in the experiment took place.
6. The student will be able to conclude by contrasting his experiment with one other experiment by a classmate.
7. The student will be able to choose the materials he will use to perform his experiment in either mold garden, landfill, or compost.
8. The student will be able to report findings and observations in drawings or tape on recorder.
9. The student will listen to other ideas and experiments and record similarities either written or drawn. (Also consider the dissimilarities.)
10. The student will be able to improve in a minor way his own ecosystem in his own town by cultivating his mold garden, landfill or compost. This will involve at least one hour weekly at the Ecology Laboratory and more time if the student should desire.
11. The student will use the information gained from his experiments to improve the cultivation of his own garden by using materials and knowledge received from the prior experiments in using wastes for benefit.

Level One

Concepts:

Earthworms and microbes help us break down wastes. Microbes do more than earthworms in breaking down wastes. Earthworms feed on dead and living microbes. Microbes feed on dead earthworms. The balance of nature comes about from earthworms eating microbes and microbes eating earthworms.

Earthworms can be seen. Microbes, plants and animals, can and cannot be seen by the naked eye. Plant microbes-bacteria, yeast, mold. Animal microbes-protozoans are microscopic. Microbes need water and food to develop.

Directions to the teacher:

Activities at school: Mold Garden

Get a round metal can or plastic jar (6-8" in diameter) 3-4" deep. Use a square or rectangle shape container. Add enough soil (loam) from under shrubbrey, to make a layer one inch deep. This should be moist, not water-logged.

Select the food for molds to grow on--kitchen refuse or discarded food items such as: nut shells, potato peels, banana skins, paper napkins, old cereal, stale bread, apple core, orange skins, etc. DO NOT INCLUDE protein--cheese, meat, gelatin or the garden will develop unpleasant odors.

Place pieces no bigger than ½" square, 1/8 X 1/4" thick, Cover the container with clear transparent plastic held in place by a rubber band. Within three days things should begin to happen. Remove clear covering occasionally to let oxygen in. Also add water if the soil seems too dry.

Directions to the students:

Look for the different colors in our garden--white, black, green, red, orange, pink, yellow, purple,blue grey. Can you tell where the color comes from? (Except for the white, cottony growth, the colors come from spores.

How do molds produce themselves? (Spores blow around and start colonies, just as a plant seed would.) Find the largest colonies--these are the mold colonies. Are any molds attacking other molds?

Keep a drawn record of which food disintegraded quickly, slowly. How long will our garden last? Is any other living thing in our garden? What is the soil like now? Is it more fertile? Why?

Correlated Activities;

Language: Point out color words, rhyming words, descriptive words. Make note of the different colors and write the color names on the corresponding mold. Learn descriptive words associated with molds: colony, color. spores, fungi, attack, mushrooms, decay, microbes, nematode worms. Find words that rhyme with mold-bold, worms-squirms, etc.

Science: A pair of students make up their own mold garden and care for it. Use drawings to show life cycles.

Physical activity: Creative drama: pretend you are a mold dispersing your spores into the air. You are hungry now, pretend you are feasting on another mold and how delicious he tastes.

Creative writing: Pretend you are a very hungry mold. You begin eating a color of mold, you pick the color and decide how it tastes. (This could also be recorded on tape.)

Art: Draw a picture of your mold garden being sure to include the various colors and formations of the molds.

Health: Use an instrument (tongue depressor) to touch the molds. Some people are allergic to molds, consequently, do not smell molds too closely, yeast infections, etc. Discuss a procedure which would be done if a child finds mold on his bread or other food he eats.

Math: Count the different kinds of molds you see in the garden.

Level Two

Concept:

Disposing of garbage by burying and then covering with a layer of soil. Decomposition is slower by this process.

Directions to the teacher:

Construct a "mini" landfill. Materials: Three or four transparent tall glasses or plastic containers. Use same soil and garbage items that went into the mold gardens. Instead of putting pieces of garbage on top, bury them at different depths placing them against the inner surface so you can see what happens. Leave about an inch to inch and a half of air space over the soil and pack it firmly to allow some aeration. Cover containers with aluminum foil and crimp the edges down.

Directions to the students:

. Give the same directions on making a landfill as it is given for teacher. Within a few days, watch for changes (mold growth). Compare these molds with the ones of a mold garden. Record on a chart or take pictures with a camera of the changes.

Questions:

Are the changes quicker of slower than the mold garden? Are there any organisms other than the molds? What happened to make the empty spaces you can see? Are they really empty spaces? What happened to the bulk of the garbage materials that occupied these spaces. Did the materials "go" somewhere?

Correlated Activities:

Language: Describe orally into a tape recorder or in writing what your land fill has in it and what changes you have seen. Learn descriptive words associated with the landfills, growth, organisms, decompose, spaces, transparent, containers, aluminum.

Science: Each set of pairs will construct their own landfill.

Creative Drama: Pretend you are a slowly decomposing piece of fruit or vegetable, etc. Act out what is gradually happening to you beginning from being buried to disappearance.

Art: Make a collage from wastes: egg cartons, straws, milk cartons, crimped paper, meat containers, cans, toothpicks, paper towels, cardboard boxes, nut shells, egg shells, etc. Mount the articles in desired way on heavy cardboard or posterboard.

Math: Record on a chart or tape recorder how long it takes (in days) for each item in your landfill to decompose.

Health: Continue recycling the garbage to give energy to other living things. Show that the wastes enrich the soil by using the soil to help a plant. Discuss washing with soap and water after making up the landfill. Discuss the odors that can develop and can be harmful-these should be guarded against in any waste decomposition areas. Use instruments to manipulate items in the landfill instead of fingers.

Variation: Water logged land fill

Directions to the teacher:

Four glasses half full of soil, add two tablespoons of sugar to first glass, two tablespoons of cornstarch to second, cut up two or three paper napkins (1/4 or 1/2") squares to add to third glass. Do not add anything to other.

Pour water into each jar and stir contents. Get it so it is water logged mud. Take out spoon and add water to 1/2" from top of glass. Cover with aluminum foil cap.

Directions to the students:

They can fill their own glasses from your directions. Watch for changes!

Variation:

Directions to the teacher and students:

Fill one glass with the same ingredients, dirt, water, and then add cheese, whites from eggs (hard boiled), meat pieces, have one glass as the control. Compare this mixture to the carbohydrate mix. Can you tell from smelling which is which - carbohydrates or protein?

Level Three

Activity at the Ecology Laboratory Composting

Secure a place to cultivate composts at the Eco-Lab. Explain how to set it up when you have the working sessions at the Lab. First meeting there should be to discuss how composts can be cultivated successfully.

Directions to the students:

All you need is a place, garbage, soil and a shovel. Remove things with metallic, glass, and ceramic bases. Also you will have better results if you remove plastics, cloth, paper and large wood pieces.

Cut refuse (kitchen scraps) into bits and pieces. Add scraps until you get a layer three to four inches deep. Then cover the organic matter with one inch of soil. Repeat the procedure by starting with three inches of refuse and add the soil.

The pile need not be large. Once a week the compost should be turned using a shovel. Why? Water may be needed also if it seems too dry. Caution against too much water. Don't waterlog. Powdered lime and rock phosphate may be sprinkled over the compost. This will make a richer end product-humus.

Variables which student may wish to introduce: After the compost has begun to work and establish itself, other materials may be added. Observations should be made as to how quickly or slowly things decompose. Things that could be added: grass cuttings, sawdust, shredded paper, pieces of cloth, metals, tin cans, broken metal toys, iron nails, foil, aluminum cans, copper wire and bronze screws.

Record what metals were added and note changes - iron rusts, copper and other metals corrode.

Some chemicals produced by microbes dissolve iron; see if they can find out which combinations will, tannic acid, which comes from nut hulls and leaves, bark, and twigs of many plants, (or can be obtained from a pharmacist).

Questions:

Can you detect the changes taking place in composting? Why do the changes take place? What can the end product be used for? (Hopefully this will induce them to want to plant some vegetables or flowers and use the humus.) Is it beneficial for the plant?

Compare composting with incineration, landfills. Which way do you like best? Which is best for the land and air? Should we encourage our neighbors, friends, and community to compost? Why? Why does the compost seem to steam on cold mornings?

All questions can be answered orally, written or on a tape recorder.

Correlated Activities:

Language: terms to know - composting, refuse, organic.

corrode, rust, iron, copper, chemicals, tannic acid, humus, litter, rubbish, trash.

Science: The definition of Garbage (taken from a report by the American Incinerator Corporation of Detroit, Mich.)

Type I: Rubbish

Combustible water-paper cartons, rags, wood shavings, sawdust, foliage, floor sweepings of all types from domestic and industrial activities. These contain 25% moisture, 10% incombustible solids and heating value 6500 B.T.U. per pound when fired (B.T.U. is British Thermal Unit, or the amount of heat required to raise the temperature of one pound of water one degree F.)

Type II: Refuse

Usually the same content by weight of both rubbish and garbage, but comes from apartment and residences 50% moisture and 7% incombustible solids. B.T.U.4300 heating value when fired.

Type III: Garbage

Animal and vegetable wastes from restaurants, hotels, hospitals, markets, cooking and feeding facilities, 70% moisture, heating value of only 2500 B.T.U. per pound for firing.

Community Action Project:

Find out from people in the Sanitation Department of your community what meanings they attach to: garbage, trash, refuse, litter, and rubbish.

Health:

Classify the different things that make up garbage in your own home:

DRY: Organic, combustible, biodegradeable, edible, ferrous metals.

WET: Inorganic, non-combustible, non-biodegradeable, non-edible (by whom or what?), non-ferrous metals.

Comments:

Selected Sources for More Information:

A System Study of Solid Waste Management in the Fresno Area; Final Report on a Solid Waste Management Demonstration. Public Health Service Publication, No. 1959, U. S. Government Printing Office, Washington, D. C., 1969.

Composting, Chapter 9. In the book Municipal Refuse Disposal. Prepared by American Public Works Association. Public Administration Service, 1313 East 60th Street, Chicago, 1960.

Franz Moore, "More Than Just a Disposal System!", Compost Sciences, pp. 4-7, July, August 1970.

J. Goldstein, Garbage As You Like It, Rodale Press, Inc. Emmaus, Penn. 1969

J. I. Rodale, and the staff of Organic Gardening and Farming Magazine, The Complete Book of Composting. Rodale Press, Inc., Emmaus, Penn., 1967.

Multi-level Submitted by Helen Metz

A COMPARATIVE STUDY OF A DESERT REGION AND A SWAMPY REGION

Behavioral Objectives:

1. The student will be able to describe the climatic conditions that are associated with swamp and desert areas.
2. The student will be able to categorize plants and animals according to their origin from a dry region or a wet region.
3. The student will be able to conclude the kind of region being described when given a description of soil, plants, and animals.
4. The student will be able to list at least five things that a desert region or a swampy region contributes to his life.
5. The student will be able to explain why the soil on the desert lacks humus.
6. The student will be able to contrast the plant life of the desert with that of the swamp. He will be able to do the same for animal life and climate, giving reasons for the differences.
7. The student will be able to contrast his life on a desert as compared to the one who lives in a swampy region according to food, clothing, habits, etc.
8. The student will be able to discuss the ways to change the areas and weigh the good and bad aspects of these changes.
9. The student will be able to reconstruct a desert area in a terrarium or diorama, placing appropriate plants and animals.
10. The student will be able to recognize swamp areas and desert areas when he is confronted with them.

Directions to the teacher:

Stimulate the students' interest in desert and swampy areas by class discussion of these areas, by asking leading questions, by introducing plants or animals from one or both regions by filmstrips, movies, pictures, bulletin boards, magazines such as Arizona Highways, National Geographic, wildlife magazines, etc.

Provide for a field trip to representative areas. Help the students make collections. Look for available resource people. Know your field trip site. Pose problems for the students and suggest methods of solving the problems. Initiate questions from the students. Provide opportunity for correlation of findings in other subject areas such as math, art, reading, writing and language.

Directions to the students:

Make a scrapbook of a desert area and a swamp area. Collect specimens of plant and animal life that is associated with each region.

Write a poem about life on the desert or in a swamp. Find pictures of desert lands that have been changed by man. Decide whether the change did more good or more damage. Take a field trip to a dry area and to a wet area. Measure the temperature of each region. If it is the same or nearly the same, why does it feel that way? Make a list of the enemies of man in each region. (Don't overlook such things as weather conditions in your list.)

Have a contest. Divide the class into two teams, assigning each team to a different region and see which team can find more uses of their region by man. Make a mural contrasting the two areas. Mark off a square yard of each area and investigate it, listing the kinds of plant and animal life you can find. Color pictures to show the adaptations that the animals of the areas have made. Start a plant from a desert environment in a wet environment. See what happens. Place an animal from a desert region in a swampy area and see what happens. Try to contrast the diets of desert animals with those of the swamp animals. Examine the skins, feet and mouths of the animals from each region. Examine the leaves and stems and the color of the plants from each region. What do you find out?

Examine the soil samples from each region. Note which soil has more humus. Use all your senses when you investigate each area. Find out how things smell, feel, and look. Listen for sounds of plants and birds and insects in each region. Try to support the statement that a desert is more likely to harbor fossils and historical evidence than a swamp.

Write a paragraph or two describing what changes you'd have to make in your way of life right now if you were suddenly transported to a swampy area or a desert area. Construct a terrarium depicting the conditions of each region. Make a tune or song by imitating the sounds that are familiar to one region or the other.

Collect samples of molding of deteriorating materials in each region. Which one has more? Can you give an explanation? Examine a soil profile in each area. Try to establish a food cycle for one or more of the animals in each region. Test each soil for water holding capacity, mineral content, etc.

Materials:

Microscope, magnifying glass, terrariums, reference books, magazines, scrapbook, and drawing materials.

Life in the Desert	Kit 21E
Camouflage in Nature	Kit 211
Deserts of the World	PS 44
Life in Ponds, Lakes and Streams	FS D 51
Soil Earth's Greatest Treasure	FS 1J59
Animal Differences	FS 1H67
Climate Adaptation	TR 410
Fresh Water Shellfish and Amphibians	FSC16
Earth's Changing Crust	FS1J72
The Great American Desert	FSK8
Soils	PS 53
What is Soil	FSG37
Water and Life	FS1J65
Animal Adaptations	FSA22
Desert and Water Animals	TR303
Frogs and More Frogs	Tape 533
Fresh Water Turtles and Fish	FSC17
Mammals and Reptiles of the Desert	TR304
Protective Coloration	TR306
Reptiles of the Desert	FSK12
Small Fresh Water Animals and Insects	FSG36
Climate Adaptation of Plants	TR411
Desert Plants and Water Plants	TR303
Animal Communities and Groups	MP230
Mammals of the Desert	FSK11
Protective Color and Shape	TR403
Reptiles of Our Living World	PS88
Small Creatures of the Desert	FSK13
Climate and Plants	FSB17
Plant Life of the Desert	FSK114
What is Soil?	MP32

Multi-level Submitted by Tom Rogers

STUDENTS EXPLORE AND TAKE ENVIRONMENTAL ACTION

Behavioral Objectives:

1. The student will be able to become further aware of local, state, and national environmental problems.
2. The student will be able to discover courses of action that they as individuals may take to help the environmental situation particularly at a local level and hopefully become motivated to take some of these steps.
3. The student will be able to discover courses of action that their families may take to help the environmental situation particularly at a local level and hopefully pursue some of these actions.
4. The student will be able to become informed relative to what influential individuals, interested groups of people, and local industries are doing about environmental problems and perhaps originate ideas for further action for these parties.
5. The student will be able to perceive man's ability to correct environmental problems as well as his ability to cause them.
6. The student will be able to learn to work with others more efficiently to achieve common goals.
7. The student will be able to use and improve language skills in working with others,in communication with his parents, and in his correspondence with adults in the environmental field.
8. The student will be able to develop and use art skills in designing, planning, and executing environmental posters and perhaps developing ideas for the creative utilization of "junk or trash" in art projects.

Directions to the teacher and students:

Begin by appointing about six students in the class to serve as committee chairmen. These students should be ones who are relatively strong in language arts and communications areas and who are capable of guiding and proofreading the writing of letters by the group.

Have these six students, one at a time, select another class member to serve on their committee until all the class members have been chosen.

Explain to the groups that their purpose will be to write to local, state, or national individuals or organizations inquiring about what they are doing with environmental problems, what plans they have for the future, and what we could possibly do to help. Let students suggest ideas for contacts. Discuss these and prepare a list of the best ones.

Here are some possibilities:

Husky Oil Co.
Wycon Chemical Co.
Frontier Airlines
Western Airlines
Union Pacific Railroad Co.
Greyhound Bus Co.
Continental Trailways Bus Co.
City of Cheyenne
Salvage companies
Pesticide manufacturers
Cheyenne Light, Fuel, and Power Co.
National Wildlife Federation
National Audubon Society
The Wilderness Society
Wyoming Game and Fish Commission
Bureau of Land Management
Governor Ed Hershler
Representative Teno Roncalio
Senator Gale McGee

Each group may chose a contact for correspondence. They may need assistance in locating mailing addresses. Discuss in general the content and form for the letters. Put chairmen in charge of their respective groups and allot time for groups to pursue the project.

When committees are finished, bring the class together, and have each chairman read his committee's letter. Discuss, evaluate, and, if necessary, make changes together. Have letters written again in final form. The teacher should then collect and correct the letters. They may now be returned for rewriting, if it is needed, or given to the school clerk to be typed and mailed. If you wish, they may be mailed in the students' own handwriting. Perhaps they would be more effective this way.

If this activity went well and if you desire, it could be repeated with each group choosing a contact for correspondence which was not used in the first round of writing. It would be wise to insert other activities between the letter writing ones for change of pace and to maintain interest. When answers to letters are received, give them - unopened - to the chairman of the committee that made the contact. Let him share it first with the members of his committee and then with the entire class.

At this point perhaps while the letter writing project is in progress, conduct a class discussion on what environmental problems exist and how we might classify them. Then using the major headings agreed upon, set up four bulletin boards similar to the following: air pollution, water pollution, land pollution and vanishing wildlife.

You may use pictures, posters, newspaper articles, litter, etc.,for each bulletin board, but, in the center just beneath the lettering of each, rig a "scroll" of white butcher paper which is entitled: What WE Can Do About it. Encourage students to look for and contribute bulletin board materials.

Next, encourage students to propose actions that they as individuals or their families could take in an attempt to alleviate environmental problems. These may be submitted either in writing or in class discussion or by both methods. Each idea should be discussed and evaluated by the entire class and, if it is deemed significant, it may be classified and written on the appropriate scroll along with the name of the person who originated the idea. If ideas are not forthcoming, a "research day" may be held during which students survey environmental materials assembled for their use for this purpose. The answers to some of the letters written earlier may prove helpful here or may contain usable suggestions. This activity may be pursued as long as interest and motivation are good. Here are some sample ideas which the students may suggest:

Air Pollution

What WE Can Do About It

Check the exhaust coming from the family car. Get an engine tune-up every 10,000 miles. Encourage the family to buy cars with small engines. Join a car pool for rides to school or parents going to work. Walk, ride a bicycle or a horse whenever possible rather than going by car.

Make a compost pile instead of burning leaves, etc. Have leaves and trash hauled away. Have garbage hauled away or bury it. Avoid burning leaves, trash, or garbage. Have home heating systems checked. Encourage others to stop smoking. Check on clean air standards for Cheyenne.

Water Pollution

What WE Can Do About It

Ask mother to use soap or phosphate-free detergents. But be careful with phosphate-free detergents--they can harm children. Use as little water as possible. Put a brick in the toilet tank to save water. Ask father to fix all leaky faucets and pipes. Help with stream and pond clean-up.

Find out how completely the city treats sewage. Find out what local industries dump into local streams. Catch rain water for our plants and animals and some household use. Use as little electricity as possible. Ask mother to use washer and dishwasher only for full loads. Turn down the heat at night.

Land Pollution

What WE Can Do About It

Carry a litter bag in the car and use it. Pick up litter left by others. Complain to companies and businesses who put up billboards along roads. Ask people who have cluttered property to clean it up. Participate in clean up projects. Use as little paper as possible. Save paper for recycling. Refuse to buy throwaway cans or bottles and ask your parents to do the same.

Ask mother to use as many FRESH fruits and vegetables as possible instead of canned, frozen or packaged ones. Recycle metal whenever possible. Recycle glass whenever possible. Buy products in returnable bottles. Fight for parks and open spaces. Be careful with fire! Plant grass and flowers around your home. Ask father to sell his old cars, at least for scrap.

Vanishing Wildlife

What WE Can Do About It

Tell people not to use harmful chemicals, pesticides, etc. Help plant trees, shrubs, and other cover. Feed wild birds and animals during winter months. Complain when the government or industry puts in highways or power lines where wild animals live.

Don't ask for or buy objects or clothing made from real fur. Don't buy purses, shoes, or other products made from alligator skins, etc. Help prevent grass and forest fires. Help out groups fighting to keep animals from becoming extinct. Hunt animals only for food and then only those that are numerous.

At any time, one or more class environmental projects should be initiated. Ideas may be called for, discussed, evaluated and decided upon by the class, and then a course of action developed and executed. Some possibilities are: School beautification, paper collection and recycling, glass recycling, aluminum or other metal recycling, stream or road beautification, use of "litter items" to create art or craft projects. One or more class periods may be taken for students to design, plan, and complete posters reflecting their class project.

When the environmental action lists on the bulletin board scrolls are complete, the students as a class with teacher guidance should select those that are the most significant. A letter to parents and teachers may then be prepared explaining briefly what we are doing, listing these significant action items, and soliciting their cooperation and assistance with our efforts.

In a follow-up activity, the letter writing committees might discuss the return correspondence that they received and think about ideas for further action that the people with whom they corresponded might take against environmental problems. If any of their ideas are worthy, they may write another letter to the party involved and present these suggestions tactfully.

Field trips could be especially meaningful during the foregoing activities. However, they should spring from the students' investigations and relate closely to activities being pursued.

Materials:

Four bulletin boards; environmental pictures, posters, articles. This is a "play-it-by-ear" project--you will need to determine what materials are required as the activities develop. Most of the materials will consist of paper materials for letter writing and art activities. You will likely have more of a problem getting rid of materials (from recycling projects) than obtaining materials.

Comments:

The activities described within this paper can be used as culminating activities to a broad Ecological Study unit, so that the students should have sufficient background for what they are now doing. The big Ecological Study unit is divided into two main parts: "Plants, Animals, and Man" or "Plants and Animals Living Together" and "Environmental Problems." And the activities described in this paper will be utilized at the end of the "Environmental Problems" section.

The activities discussed herein are non-graded. Perhaps they are most completely usable at the intermediate level, but much of it can be adapted to the primary level as well. These activities are extremely flexible and very much open-ended.

Reference:

Ecology Begins at Home, (Pamphlet), State Department of Education, E. Q. Index, National Wildlife Federation, Salem, Oregon, 1971.

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Multi-level Submitted by James Zachman

LET'S ADOPT A TREE

Behavioral Objectives:

1. The student will be able to explain the changes that take place in the tree during the year and their importance in nature's plan.
2. The student will be able to explain why changes take place in the tree at different times of the year.
3. The student will be able to show the changes that have taken place in the tree and give evidence of other plant and animal life that is dependent upon the tree.
4. The student will be able to identify the most frequent visitors to the tree.
5. The student will be able to summarize and compile his findings.
6. The student will be able to compare the specific tree with others.
7. The student will seek more information about the identity of the tree.
8. The student will watch for visitors (animal or bird) to the tree.
9. The student will discuss growth changes, seasonal changes, etc. in the tree.
10. The student will demonstrate a general interest in plant life resulting from the study of "his" tree.

Directions to the teacher:

Give adequate preparation for a study of trees and plant life. Gather resource materials relating to the project. Help students plan ways the project may be carried out. Plan field trips to the Horticultural Station, Eco-Lab grounds and/or other appropriate locations. Provide record keeping materials for the project.

Directions to the students:

Select a tree on or near the school grounds. Identify the tree. Watch for changes in the foliage of the tree--i.e. color, etc. Watch for leaves to fall. Look for visitors to the tree. Watch for animals and birds that make their home in the tree.

Measure changes in growth of the tree during the year. Watch for fungi, moss, and other plant life growing on the tree. Visit other trees and decide how they are similar or different from "your" tree. Investigate tree and plant life as it exists in other areas; for example, the warmer climate of the south and colder climates of the north.

Materials:

Selected tree, measuring instruments and other materials necessary to make desired observations, record keeping books or materials: and reference books, films, etc.

Suggested Reference Materials:

Filmstrips

Autumn is Here	FS J21
Changes in Weather	FS J38
Changing Seasons	FS 1A2
Soil: Earth's Greatest Treasure	FS 1J59
Spring is Here	FS 048
Summer is Here	FS 047
We Learn About Weather	FS J37
World of Living Things	FS W22
Birds and Homes (Parts A and B)	FS A38, FS K 32
Birds of Forest and Woodland	FS S17
Birds of the Garden	FS S19
Insects	FS D15
Story of the Robin	FS G11
Climate and Plants	FS B17
How Seeds Travel	FS 1F100
Leaves and Their Work	FS 1159
Plants Grow and Change	FS K28
Roots and Their Work	FS 1157
Telling Trees Apart	FS H22
Trees Grow	FS K29

Motion Pictures

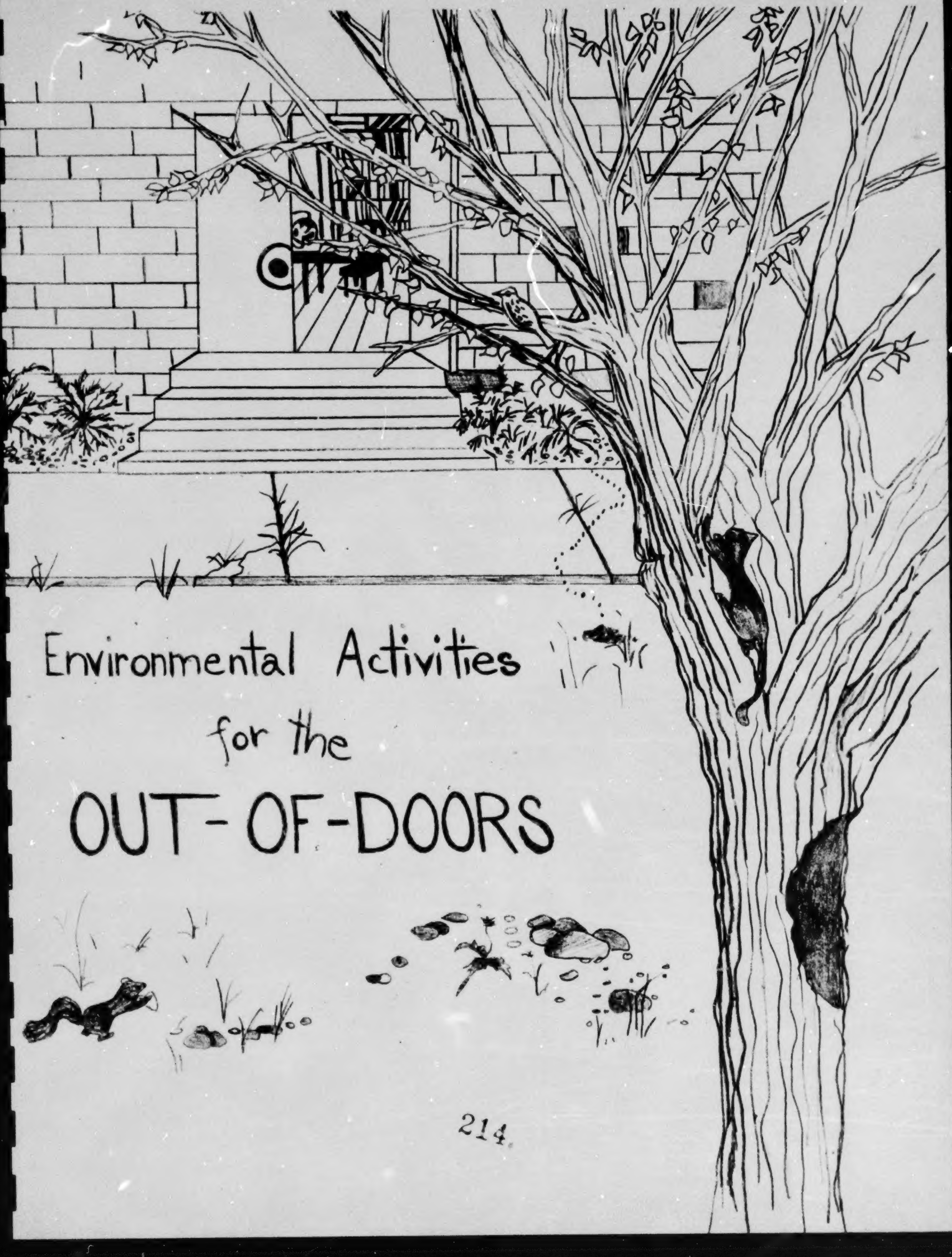
Fall is Here	MP 258
Forests (Picture Set)	PS 55
Spring is Here	MP 256
Summer is Here	MP 257
Winter is Here	MP 259
What is a Bird	MP 441
Seeds Grow into Plants	MP 271

Books and Other Written Materials:

Many agencies publish free materials in the areas of bird life, trees, etc., for example: U. S. Dept. of Agriculture--Forest Service, State Depts. of Agriculture, Game and Fish Commissions, and American Forest Products Industries.

Book and publications availabe to supplement this project are almost unlimited in number. Examples are:

How and Why Wonder Books	Grosset
First Book of Birds	Watts
First Book of Plants	Watts
Tree-Watching - Environmental Science Center, Golden Valley, Minn.	
Birds will Come to You (Fox)	Reilly
Timber: Farming Our Forests	Putnam
Tree is a plant (Lignell)	Crowell



Environmental Activities for the OUT-OF-DOORS

INSECTS AND GARDEN

Intermediate Submitted by Earl Richardson

COLLECTING INSECTS

Behavioral Objectives:

1. The student will be able to describe how to collect insects.
2. The student will be able to state four areas in which to find insects for collecting.
3. The student will be able to demonstrate two ways to collect insects.
4. The student will voluntarily read books related to collecting insects.
5. The student will go into an area and collect insects.
6. The student will be able, when presented with a list of insects, to pick out a method to collect each insect.
7. The student will be able to state how the area is related to the type of insect found there.

Directions to the teacher:

Have students go out into a specified area and try collecting insects by hand and by using a jar. Discuss the types of insects caught and other ways of catching insects.

Demonstrate to the students how to make a sugar solution jar and put into the field. Also demonstrate how to make an insect net from a nylon stocking and clothes hanger.

Directions to the students:

Go out into the area and collect all of the insects you can by using your hand and a jar. Think of other ways to catch insects.

Put several sugar solution jars in the area. Discuss the insects attracted to the jars.

Take a net made from a nylon stocking and a clothes hanger and collect insects. Discuss the insects caught by the nets.

Materials:

A jar used for collecting insects, sugar, a large jar and a net.

Comments:

A small amount of sugar solution is all that is needed in each jar. The jar can be checked every thirty minutes.

Intermediate Submitted by Earl Richardson

SOIL

First Activity: Collecting Soil

Behavioral Objectives:

1. The student will be able to describe how to collect soil samples.
2. The student will be able to name and describe three areas to take soil samples.
3. The student will be able, when presented with a list of materials and tools, to pick out the necessary items needed.
4. The student will be able to state the purpose of collecting soil and its relationship to man.
5. The student will be able to demonstrate how to collect soil samples.
6. The student will choose soil samples from different areas and compare physical differences.
7. The student will be able to collect soil samples using the proper tools.

Directions to the teacher:

Instruct the students how to secure soil samples within the root zone with a hand shovel and/or a hand auger. Take the students out to the garden, a grassy, semi-arid area, and a pond area to take samples.

Discuss areas where different soils were found.

Directions to the Students:

Take soil samples from each area we stop at and put in plastic bag and write down where sample was taken. You are to observe the different areas. Describe the different areas and write down the differences for later discussion.

Fill a glass jar about half full of garden soil when you take your other samples.

Materials:

A glass jar, plastic soil sample bag, hand shovel and/or hand auger.

Comments:

Other areas could be used and more samples taken if desired. Time allowed for activities involving the soil would possibly regulate this.

Intermediate Submitted by Earl Richardson

SOIL

Second Activity: Soil Introduction

Behavioral Objectives:

1. The student will be able to define "topsoil."
2. The student will be able to state three ways soils may differ.
3. The student will be able, when given a list of materials to pick out three types of materials that make up soil.
4. The student will be able to state how the make up of materials in the soil determine the water holding ability of the soil.
5. The student will be able to draw a soil chart and label the different materials found in the soil.
6. The student will voluntarily read materials about soil and its formation.
7. The student will be able to do the activity involving the use of his hands.

Directions to the teacher:

Take a soil sample from the garden area in a jar and do the activity before the class does it. When the activity has been set up and observed by the students, discuss the different types of soils, their water absorbing and holding ability.

Directions to the students:

Take jar of soil and fill almost to the top with water and shake. Let the materials settle and observe layers that develop. Observe and write down what materials you see.

Materials:

A jar, half full of soil from the garden, and water.

Comments:

The garden area soil creates all the necessary layers to be observed. Different kinds of soils can be demonstrated by this activity.

Intermediate — Submitted by Earl Richardson

IDENTIFICATION OF INSECTS

Behavioral Objectives:

1. The student will be able to define "insect."
2. The student will be able to state two differences between several kinds of insects.
3. The student will be able, when presented with an insect specimen, to pick out three characteristics to help in identification.
4. The student will be able to state how physical characteristics help an insect relate to its environment.
5. When provided with some insects, the student will be able to identify them by observing physical characteristics.
6. The student will voluntarily read materials about insects.
7. The student will collect insects for studying and identification.

Directions to the teacher:

The teacher should have a good background in this area or read a handbook extensively before doing this activity. Give the students a background on insects to be found in this area.

Demonstrate how to pin and label an insect for mounting, use a spreading board, and use a killing jar.

Instruct student how to use an insect key.

Note: Much of the detailed information needed for the teacher can be found in How to Know the Insects by H. E. Jaques. This book can be found in quantity at the Eco-Lab library.

Directions to students:

Pin your insects and spread them properly. Take your key and read pages 42-46 in How to Know the Insects for discussion. These pages will assist you in how to use the key for the insects you have collected and will collect during the unit on insects.

Take your key, insects and hand lens to identify and label using the order, family, scientific name, and common name using paper and pins.

Pin your labeled insect on a cardboard sheet.

Materials:

Cardboard sheets for mounting, insect pins, spreading boards, killing jars, small sheets of paper for labels. How to Know the Insects by H. E. Jaques.

Intermediate Submitted by Earl Richardson

PREPARATION FOR A GARDEN

First Activity

Safety in the Garden

Behavioral Objectives:

1. The student will be able to define "unsafe conduct."
2. The student will be able to state at least four ways to handle garden tools in a safe manner.
3. The student will be able, when presented a set of circumstances, pick out three unsafe acts in a given situation.
4. The student will be able to state how the behavior of the student working in an unsafe manner can affect the students working around him.
5. The student will be able to pick out unsafe conduct from a list describing safe and unsafe conduct.
6. The student will voluntarily practice safe conduct with garden tools.
7. The student will be able to clean and place the garden tools in a safe position.

Directions to the teacher:

The teacher should assign space for the students to store garden tools after each use. Teacher should instruct the students in methods of cleaning tools and correct position for storage. After discussion, have students demonstrate how to use each tool correctly. Encourage the students to practice safety all of the time.

Directions to the students:

Put all tools, with sharp side down in an area designated by the teacher when tools are not in use.

Work in garden with tools without swinging them around, goofing off, hitting the ground unusually hard, etc.

Look for students who do not handle tools properly.

Materials:

Garden rakes, hoes, shovels, hand rakes, and any other garden tool needed for the situation.

Comments:

Safety in the garden can be more enjoyable to all concerned.

Intermediate   Submitted by Earl Richardson

PREPARATION FOR A GARDEN

Second Activity

Preparing Soil for a Garden

Behavioral Objectives:

1. The student will be able to define a well-prepared seed bed.
2. The student will be able to state three operations that are needed to prepare a seed bed.
3. The student will be able to pick from a list two materials in the seed bed that need to be removed from the soil before planting.
4. The student will be able to state how well-prepared soil is related to seed germination and growth.
5. The student will be able to rank in order of the best prepared soil to the poorest prepared soil when given three samples.
6. The student will choose and investigate a problem in preparing a seed bed for planting.
7. The student will do the physical activities that are needed to prepare the soil properly.

Directions to the teacher:

Make sure there are enough activities for each student in class. Have students change activities every fifteen minutes and be careful that they do not develop blisters.

Let freshly spaded soil set for at least one day before raking and leveling soil because it will pack.

Directions to the students:

Spade soil in a way so that you do not step on it and pack it down.

Break up large pieces of soil with hands or tools into fine soil. Shake soil from roots and put them into a pile on the side of the garden plot. Put rocks into another pile on the side of the plot.

Work soil until fine and most of the visible rocks and roots are removed from garden.

Level the soil in the plot and you will be ready to measure off the rows with stakes and string (activity number three).

Materials:

Garden tools

Comments:

The soil can be leveled by pulling a ladder or two heavy boards tied together about eighteen inches apart across the plot several times. The roots can be put back between rows as a mulch.

Intermediate Submitted by Earl Richardson

PREPARATION FOR A GARDEN

Third Activity

Measuring Plot for Area and Rows for Plants and Seeds

Behavioral Objectives:

1. The student will be able to identify different ways of measuring a plot 25 by 30 feet.
2. The student will be able to state three operations needed in measuring the area and rows for planting seeds.
3. The student will be able to measure the distance between each row of seeds or plants by reading directions on the back of seed packages and from a chart (developed by another activity).
4. The student will be able to state the importance of measuring and staking out plot before planting.
5. The student will be able to measure a 25 by 30 foot garden plot using a yard stick or measuring tape.
6. The student will propose a way to improve accuracy and/or for better utilization of the area through measuring and using stakes.
7. The student will be able to develop a relatively straight row by driving wooden stakes and stretching a string along each row and around the perimeter of the area.

Directions to the teacher:

The students should be divided into working groups of two. The students, through discussion (and in activity where seed chart was developed), will determine the directions using measuring stick or tape, stakes and string. When they have finished, discuss ways of improvement.

Directions to the students:

Follow the chart and/or the seed packets to determine the width of the rows (length) will depend upon seeds being planted, direction of row, etc.) and hammer stakes into ground; stretch string between stakes. Work in groups of two and cooperate with other groups.

Materials:

Hammer, wooden stakes, string, yard stick, meter stick or measuring tape

Comments:

Perimeter can be taught, as well as square inches, feet and yards using the measurement 25 by 30.

Intermediate   Submitted by Earl Richardson

AN INTRODUCTION TO SOIL EROSION

Behavioral Objectives:

1. The student will be able to define "soil erosion."
2. The student will be able to state three reasons for soil erosion.
3. The student will be able, when presented with a given situation, to describe two ways to stop soil erosion.
4. The student will be able to state how soil erosion is interrelated to plant and animal life.
5. When provided with a list containing descriptions of soil conservation and non-conservation procedures, the student will be able to pick out the soil conservation procedures.
6. The student will choose a soil erosion problem and explain the cause and how to stop it.
7. The student will perform irrigation and sprinkling procedures in such a manner as to avoid soil erosion.

Directions to the teacher:

Be familiar with the area and know where erosion can be found and what caused it.

Review soil and its components, topsoil, and subsoil with students.

Introduce soil erosion and its causes.

Directions to the students:

Do the watering of your garden by irrigation with running water and by sprinkling. Observe and write what happens and use your findings for discussion.

Walk along trail in area and write observations of soil erosion and its possible causes for later discussion.

Materials:

Watering area with sprinkling hose and irrigation with running water.

Comments:

There are many activities that can be used to illustrate wind and water erosion. Booklets can be obtained through U.S. Department of Agriculture. Time, age, ability, and background of student will determine the extent of the activities.

A field trip to locate other areas of soil erosion could also be used in this activity.

Intermediate Submitted by Ann Carver

A GARDEN CHART

Behavioral Objectives:

1. The student will be able to define the growth pattern of specified garden seeds.
2. The student will be able to state at least five specific reasons why he charted the seed as he did on the chart.
3. The student will be able, when presented with garden seed packets, to group the seeds into at least two different groups.
4. The student will be able, when presented with the dimensions of a garden area, to set up a chart in ratio to the garden area.
5. The student will be able, when presented with a chart of the garden area, to read it skillfully.
6. The student will be able to state how each row on the garden chart interrelates with one another.
7. When provided with descriptive accounts of at least three garden seeds, the student will be able to chart them according to their growth pattern in relation to each other.
8. When provided with descriptive accounts of at least three garden seeds, the student will be able to rank the seeds in order of the greatest to the least amount of space each seed will need.
9. When provided with descriptive accounts of three garden charts, the student will be able to list the differences in planting arrangement of each chart.
10. The student will voluntarily read the materials on the back of the seed packets to find out the following information: space of rows, depth of planting, spacing of seeds in the row.
11. The student will be able to reproduce the chart to the garden area.

Directions to the teacher:

After the students have grouped the seeds according to their growth pattern, have them make a scaled chart of the garden area. They may need help in figuring out the correct ratio. Then help them to plot their seeds on the chart making sure they use the correct spacing.

Directions to the students:

After reading the back of each seed packet, which seeds do you think could be grouped together according to their growth pattern? Which seeds need more growing space than others? Which seeds are going to mature faster than others?

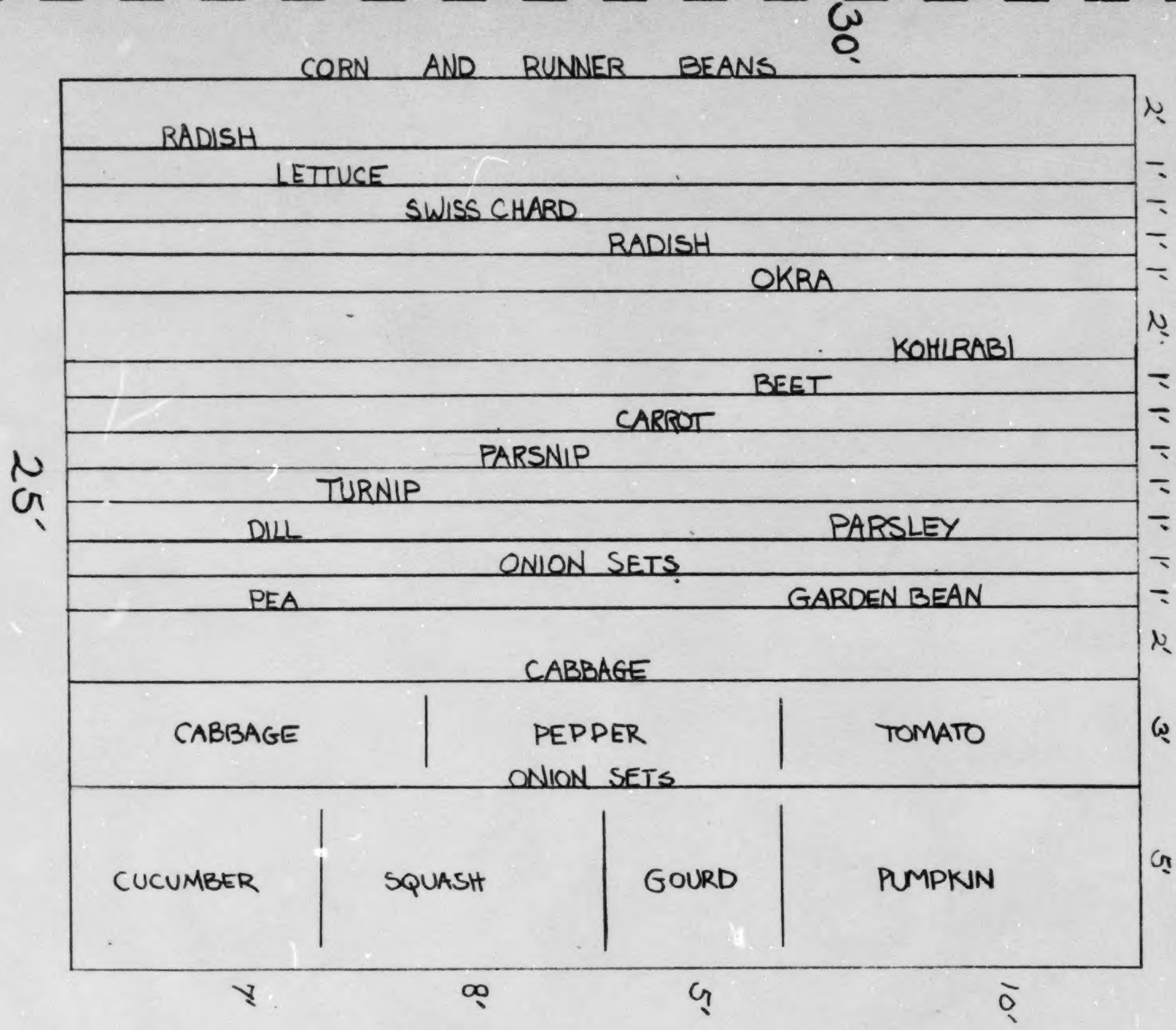
Now that we know something about the growth of the seeds, let's plot them on a chart. If our garden plot is 25' x 30' how big shall we make our chart? If one inch on our chart is equal to one foot in the garden area, how far apart shall we make our carrots and beets on the chart? How far apart will the carrots and beets be when we plant them in the garden? Now let's make sure we have all of our seeds plotted on the chart.

Materials:

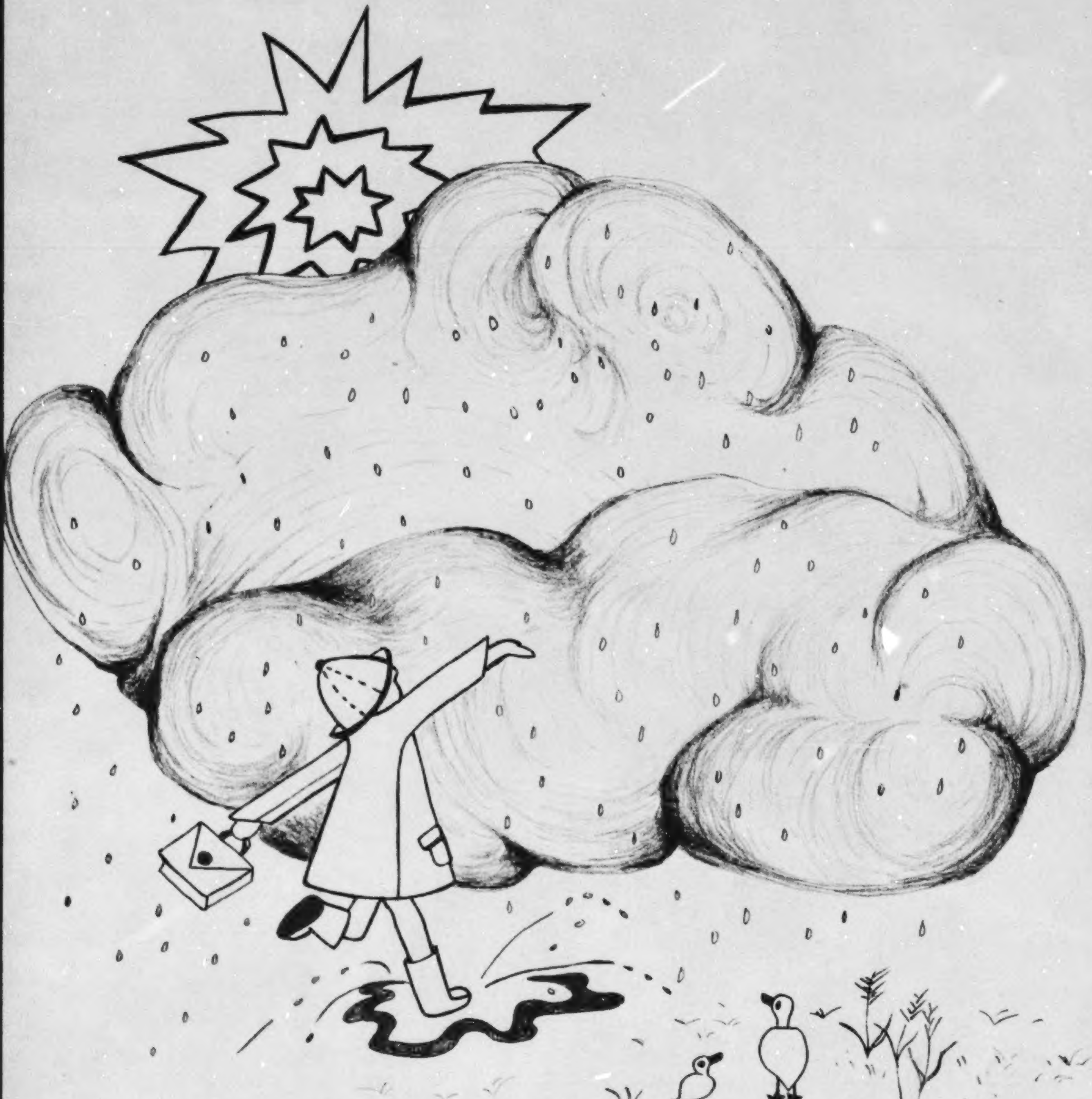
Seed packets, chart paper, yard stick and pencil

Comments:

Each student had a turn to make at least one row on the chart. The students will be better prepared to transfer the chart to the actual garden area because they decided how and where they wanted to plant the garden seeds.


30'
CORN AND RUNNER BEANS
2'
RADISH
1'
LETTUCE
1'
SWISS CHARD
1'
RADISH
1'
OKRA
1'
2'
KOHLRABI
1'
BEET
1'
CARROT
1'
PARSNIP
1'
TURNIP
1'
DILL
PARSLEY
1'
ONION SETS
1'
PEA
GARDEN BEAN
1'
2'
CABBAGE
3'
CABBAGE
PEPPER
TOMATO
ONION SETS
5'
CUCUMBER
SQUASH
GOURD
PUMPKIN
25'
7'
8'
5'
10'

The classroom scale was in a ratio of one inch to one foot of the actual garden plot. For the purpose of the booklet, scale: 1/4" = 1'



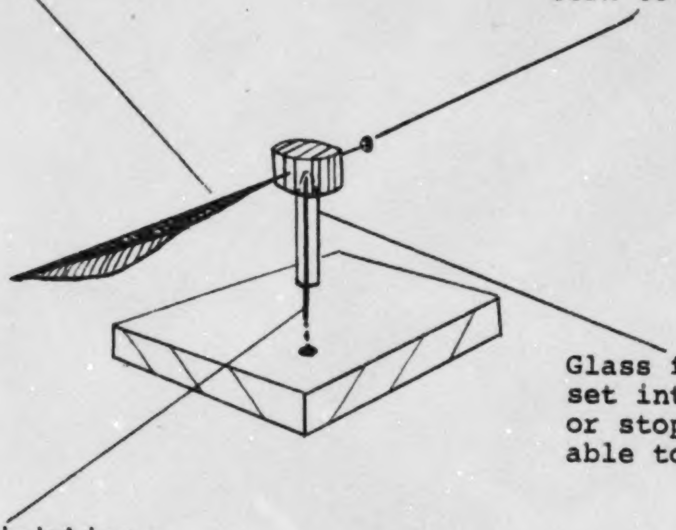
Intermediate   Submitted by Ann Carver

WHICH WAY DOES THE WIND BLOW?

Behavioral Objectives:

1. The student will be able to define "weather vane."
2. The student will be able to state the use of a weather vane.
3. The student will be able to state several types of weather vanes.
4. The student will be able, when presented with a weather vane, to tell which way the wind is blowing.
5. When provided with descriptive accounts of three instruments, the student will be able to identify which instrument is used to tell wind direction.
6. The student will investigate the use of a weather vane.
7. The student will be able to make a weather vane.

Directions to the teacher:



Feather set into cork or one hole stopper

Small nail which can be moved in or out of cork to balance feather

Glass from eye dropper set into hole in cork or stopper must be able to move freely.

Three inch finishing nail driven through base.

Stress that no matter which way the weather vane sets, it still will indicate the wind direction.

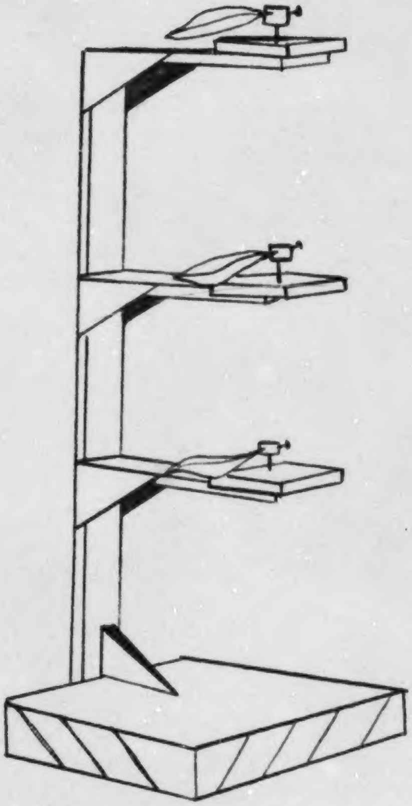
This vane can be used on a wind stand. Place the wind vane on the stand with a rubber band.

Directions to the students:

Today we are going to measure wind direction. What way can you think of to measure wind direction. Let's make a wind vane. What direction is the wind blowing today? Does it matter which way we set the wind vane? What other ways can you think of to measure wind direction?

Materials:

Wind stand, rubber band, 4" X 4" block, 3" nail, 2" nail, eye dropper, feather, and cork or stopper.



Wind Vane on Stand

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Intermediate Submitted by Ann Carver

THE USE OF A COMPASS

Behavioral Objectives:

1. The student will be able to define the purpose of a compass.
2. The student will be able to state at least five directions that can be located by using the compass.
3. The student will be able, when presented with a compass, to pick out at least two 45° and 90° angles.
4. The student will be able to state that the magnetic field causes the needle on the compass to point north.
5. When provided with descriptive accounts of three instruments, the student will be able to list which instrument will help him the greatest in finding direction.
6. The student will choose and investigate what direction he thinks is north.
7. The student will be able to demonstrate the angles on a compass by using his own body, along with other students, as a station.

Directions to the teacher:

Most of the lesson can be done through discovery. Take the children out into an open field. Divide the class according to the number in the class. Each group should have three to five students. Have the students face the direction they think is north. Give each group a compass. Each student in the group will have a chance to use the compass to see if the direction he faced was really north. Once the student has found north, he will be able to point out the other three directions.

The next part of the lesson is spent on the angles (45° and 90°) that can be demonstrated (by the students) while studying the compass.

Discuss the magnetic field with the students when the question "Why does the needle point north?" arises. The directions and angles can be demonstrated by the students.

Directions to the students:

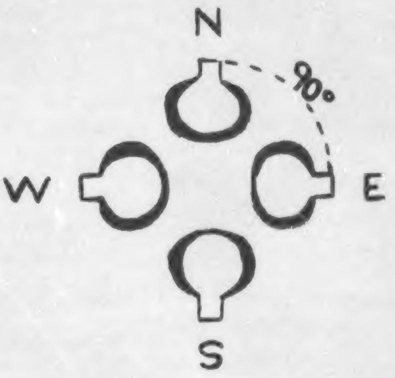
Do you know what direction is north? Face the direction you think is north. With the use of a compass, you will find out if you are facing north. Now let's find seven other directions using the compass. Now let's make 90° and 45° angles with these directions.

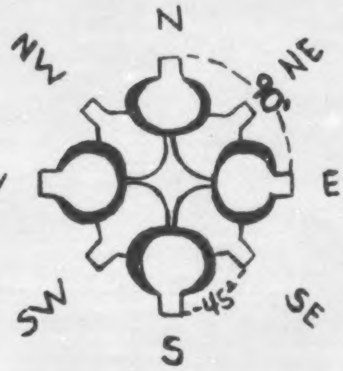
Materials:

Compass

Comments:

The students remembered the directions at the Eco-Lab more vividly by finding them out through discovery.




N
NW
NE
90°
W
E
SW
45°
SE
S

○ = Child with arms stretched out in front of him.

Intermediate Submitted by Ann Carver

CLOUD FORMATIONS

Behavioral Objectives:

1. The student will be able to define clouds.
2. The student will be able to state at least five cloud formations that he has observed at the Eco-Lab.
3. The student will be able, when presented with a set of cloud pictures, to pick out at least two formations that he will be able to name.
4. The student will be able, when presented with a described cloud formation, to predict what weather will accompany that cloud formation.
5. The student will be able to state why precipitation falls from a cloud.
6. The student will be able to state why some clouds disappear.
7. When provided with descriptive accounts of three types of clouds, the student will be able to rank the formations in order of the fairest weather to the least fair weather.
8. The student will voluntarily read materials regarding cloud formation in the following areas: shape, color, prediction of weather.
9. The student will be able to sketch a cloud formation he has observed.
10. The student will be able to manipulate materials into a three dimensional affect.

First Activity

Observing and Sketching Cloud Formations

Directions to the teacher:

Have several books about clouds available for the students. Choose books that have good cloud formations in them. Take a "detective trip" outside and discover as many cloud formations as possible. Point out to the children how each cloud keeps changing in size, shape, and color. Have the students label and draw all the cloud formations they have discovered. This activity will be used throughout the entire course.

A follow-up lesson showing slides of cloud formations is helpful for the students to remember the different types of clouds.

Directions to the students:

Look at the clouds. Do they all look the same?

you know the name of any of the cloud formations? Let's use our cloud books and see how many we can identify. Now choose one cloud and make a sketch of it on your paper. Try to use a little background (country side) while you sketch your pictures.

Materials:

Pencil, paper, chart paper, crayons

Instructional Materials:

Forecasting the Weather, Louis D. Rubin
Weather, Philip D. Thompson, Robert O'Brien, and the Editors of LIFE
Earth Science Transparencies for the overhead projector M-4 and M-5, Hubbard Science Company
Meteorology (cloud types), View File, Hubbard Science Company

Second Activity

A Cloud Collage

Directions to the teacher:

Have several different types of material ready for the students such as buttons, yarn, small tree branches, scrap material, and cotton. Have chart paper cut into the desired size.

Directions to the students:

Let's find your sketches you made of a cloud yesterday. Today we are going to make a cloud collage from your sketch. Do you know what a collage is? Let's transfer your sketch to the chart paper. Now using the materials in front of you, fill your sketch in.

Materials:

Chart paper, glue, pencils, crayons, collage materials - yarn, buttons, scrap material, tree branches and cotton

Comments:

In identifying cloud formations, we classified them into ten basic types - cirrus, cirro cumulus, cirro stratus, alto cumulus, alto stratus, strato cumulus, stratus, nimbo stratus, cumulus, and cumulo nimbus. Most of the emphasis was placed on the most common clouds.

Intermediate Submitted by Ann Carver

WEATHER INSTRUMENTS AND THEIR HOUSE

Behavioral Objectives:

1. The student will be able to define the following terms: 1) rain gauge, 2) thermometer, 3) wind meter, 4) anemometer, 5) wind vane, 6) hygrometer, 7) sling psychrometer, and 8) barometer.
2. The student will be able to define a weather station and its function.
3. The student will be able to determine the relative humidity by charting the wet and dry with readings correctly.
4. The student will be able to read each of the above instruments accurately.
5. The student will be able, when presented with a daily weather chart, to fill in the chart using the weather instruments.
6. The student will be able to state how the cloud formations and weather instruments can help him predict the weather.
7. When provided with a set of weather instruments, the student will be able to state how each instrument can be used as a measuring device.
8. The student will investigate and use each of the weather instruments.
9. The student will be able to daily set up and dismantle the weather station.

Directions to the teacher:

Become familiar with each weather instrument before presenting the lesson to the class. Decide which instruments are to be used in the weather station.

Directions to the students:

Today we are going to set up our weather station. But first, we must examine our instruments and learn what each instrument is going to measure. Let's make a chart listing the instruments and their use. What is the name of the instrument? What do we measure with a thermometer? Why is it called a maximum-minimum thermometer? What unit of measure do we use to tell temperature? Use the same procedure with each of the other instruments.

Chart example

Instrument	What it measures
Rain Gauge	Rain fall
Thermometer	Temperature
Wind Meter or Anemometer	Wind velocity
Hygrometer and/or Sling Psychrometer	Relative humidity
Barometer	Air pressure
Weather Vane	Wind direction

Now let's set up our weather station. What instruments do you think can be put in our station?

Now that we know what each instrument is called and what it measures, let's learn how to take readings with each instrument. Let's keep a chart of our daily weather readings. See attached chart.

Materials:

Weather station, weather instruments, including rain gauge, thermometer (maximum-minimum), wind meter or anemometer, wind vane, hygrometer, sling psychrometer and barometer, and chart paper.

Comments:

If time permits, many of the above instruments could be made in the classroom.

Weather Chart

Type of Weather Predicted	Temperature	Air Pressure	Rainfall	Humidity	Wind Direction	Wind Speed	Clouds

Intermediate Submitted by Ann Carver

TEMPERATURE ABOVE THE GROUND SURFACE

Behavioral Objectives:

1. The student will be able to define temperature.
2. The student will be able to state at least four areas in which ground surface temperatures are different.
3. The student will be able to state at least four variables in taking the temperatures.
4. The student will be able to describe causes of variations in vertical temperatures.
5. The student will be able to estimate temperatures beyond the height of the stand.
6. The student will be able to state how each ground surface area is different.
7. When provided with descriptive accounts of three areas, the student will be able to rank the areas in order of the warmest to the least warmest areas.
8. The student will choose and investigate areas to be used in taking temperatures above the ground surface.
9. The student will be able to take accurate temperature readings with the thermometer.

Directions to the teacher:

The temperature stands will be used in this lesson. Help the students to place the tin foil tubes on the stand. Help the students to measure and place one tube at two inches above the ground, one tube at four inches above the ground, one tube at eight inches above the ground, and one tube twenty-four inches above the ground. Place the tubes on the stand with rubber bands. Set up the other three stands in the same manner. Place one stand in a shaded area, one stand in a grassy area, one stand on a bare ground area, and one stand on the sidewalk.

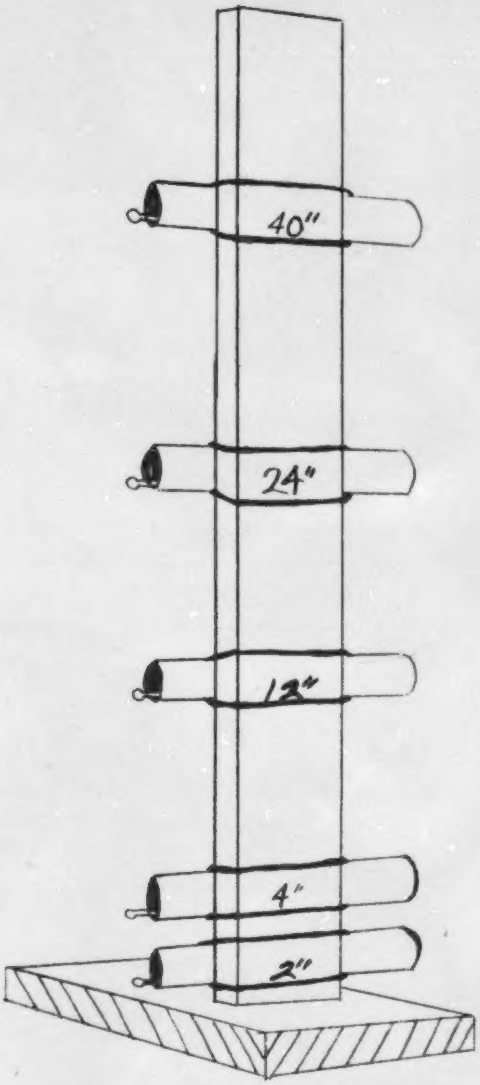
Stress the variables in taking temperatures with the stands such as: 1) Is the stand straight? 2) Are the tubes level? 3) Was the thermometer placed all the way in the tube? 4) Is ground evaporation taking place? Discuss with the students that the temperature will vary more at the bottom of the stand than at the top. A good example to use is a burner and pan as compared with the sun and the earth.

Directions to the students:

Today we are going to use the temperature stands you made to measure ground surface temperatures. Let's place the foil covered tubes on the stand. Where shall we set our stands outside? What different types of surface areas do we have? What variables can you think of that would affect our readings? Why is the temperature warmer closer to the ground? Where does the temperature vary the greatest? If we had a tube thirty-six inches above the ground, what do you think the temperature would be? Which area is the warmest? Which area is next?

Materials:

Temperature stands, thermometers, yardstick, rubber bands and tubes covered with foil.



Thermometer placed in mailing tube that has been covered with foil.

Mailing tube is held in place with rubber band.

Intermediate Submitted by Ann Carver

OBSERVING WEATHER FACTORS

Behavioral Objectives:

1. The student will be able to define "weather factors."
2. The student will be able to state at least five weather factors that he has observed at the Eco-Lab.
3. The student will be able to state at least two weather factors that would apply to any chosen day.
4. The student will be able, when presented with a set of weather factors, to pick out at least two factors which would depict the weather that day.
5. The student will be able to state how behavior of man in a described situation would be interrelated with weather factors.
6. When provided with descriptive accounts of three weather situations, the student will be able to rank the situations in order of the most pleasant to the least pleasant situation.
7. When provided with descriptive accounts of three different colors, the student will be able to rank the colors in order of the greatest to the least amount of absorption of solar energy.
8. The student will voluntarily read materials regarding weather factors in one of the following areas: clouds, solar energy, wind direction and velocity.
9. The student will be able to feel many of the weather factors using his own body as an instrument.

Directions to the teacher:

Discuss the different types of weather factors. Take the students outside for observation. Each student will make a list of weather factors he observed. At the end of the period, discuss the different factors they have found.

Directions to the students:

Can you tell what weather factors make up our weather today? What other factors can you think of that are not factors today? Let's go outside and observe the weather factors we have today. Do you feel any moisture in the air? What direction is the wind blowing? How fast do you think it is blowing? Do you see any clouds in the sky?

Is the sun being hidden from the clouds? Which side of the Eco-Lab is the warmest? Why? Look around at your classmates and see which one is going to absorb the most solar energy beoause of the clothing he is wearing.

Materials:

Pencil, notebook or paper

Intermediate   Submitted by Ann Carver

WATER CYCLE

Behavioral Objectives:

1. The student will be able to define "water cycle."
2. The student will be able to state at least five sources from which water is recycled.
3. The student will be able to state at least four forms of precipitation.
4. The student will be able, when sprinkling the garden area, to explain how the water cycle is at work in this particular situation.
5. The student will be able to state how behavior of man is affected by the water cycle.
6. The student will be able to state how the water cycle is a part of our weather.
7. When provided with descriptive accounts of three situations, the student will be able to tell how it fits into the water cycle.
8. The student will voluntarily read materials regarding the water cycle.
9. The student will investigate how the water cycle takes place in the garden area.
10. The student will be able to reproduce a sketch of one water cycle.

Directions to the teacher:

A discussion of the water cycle can be created through the watering of the garden area. Discuss with the student what happens to the water after it is sprinkled on the garden. From this point bring in a discussion of the entire water cycle. Emphasize that the sprinkling of the garden is only a small part of the water cycle.

Directions to the students:

What is happening to the water that we are sprinkling on the garden? Do the plants use all the water? Does some of the water evaporate? What is water vapor? What is condensation? Let's look at a chart to see all the sources of the water cycle. Why do they call this operation a water cycle.

Materials:

Sprinkler and hose

Comments:

The student will feel a part of the water cycle once he is contributing to it while watering the garden.

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Intermediate Submitted by Jacquelyn Cardosi

WHAT'S IN A POND?

Behavioral Objectives:

1. The student will be able to list five safety techniques in field investigation.
2. The student will be able to state at least two visible differences of samples taken at various sites.
3. When given a description of sites, the student will be able to state a scientific method of collection.
4. When given two samples of pond water, the student will be able to choose the sample containing the greater amount of plant life.
5. Given samples of pond life, the student will be able to determine under a microscope which contains chlorophyll.
6. When shown plant and animal life (one-celled) found in pond water, the student will be able to state their relationship with each other.
7. The student will be able to locate sites on the map, plot a route, collect specimens within a designated amount of time.
8. The student will be able to locate algae or protozoa under a microscope.

Directions to the teacher:

Before the actual field trip, discuss safety and purpose in field investigations. Show ponds and streams with a map of the Eco-Lab. Allow the students to choose sites for investigation. Do consider time element. With a group size of about 20, it will take approximately 60-90 minutes to make a complete sweep of all areas (two ponds and a number of stream samples). Therefore, it may be well to limit the site areas. Mark a route on the map. Take the map along and have the students follow their route.

Upon reaching the sites, explain the proper technique of collection. Allow the students to collect samples. Label the samples at the sites; do not wait until returning to the classroom. Again, allow team work.

Directions to the students:

You will collect a water sample at the site marked. Remember safety techniques in the field when passing through barbed wire, carrying glass jars, etc. Follow the route on the map to site location. Find a secure position to collect a water sample. Place the collection jar in the water and fill the bottle. Allow this water to flow back in pond or stream. Rinse the collection jar in this manner two or three times. Now, collect the sample! Cap the jar. Label the collection jar with data: date, location, team. Note any visible life in the water sample in the science notebook. Return to the classroom where further investigation will be carried on.

Materials:

Collection jars, labels or masking tape, magic markers, and a map of Eco-Lab showing streams and ponds.

Comments:

Safety and purpose are essential in field investigation. This is a basic element in science. The students may have to cross streams, go through barbed wire, etc. Therefore, the teacher must stress care and observation. Collection of samples is another technique important in science. Proper explanation, before, saves collection of poor samples. Examine the appearance of samples at each site. Remember the purpose is to collect water not mud!

Using the map is advantageous because students learn to locate various areas they will work in. The amount of sample sites used depends on the length of time allotted for this activity. Students should wear proper clothing for this type of work, especially shoes.

INVISIBLE - VISIBLE

Directions to the teacher:

This activity begins in the classroom using the collected water samples. Before the student is able to find pond life, he must be able to handle the tool designed for this use - the MICROSCOPE. Use both the hand microscopes and the more powerful Bausch & Lomb microscopes. Set up four or five of the Bausch & Lomb scopes with slides of algae from pond water.

Give each student a hand microscope. Using the instructions, allow students to manipulate parts and see how it maneuvers. Have each student demonstrate ability to focus slide provided with hand scopes. Then have them work at the Bausch & Lomb scopes. Have them sketch what they see in field of light. Discuss what they see individually or in groups.

Directions to the students:

Demonstrate ability to use the hand microscope. After the teacher has demonstrated parts and use, bring in focus the slide provided. Perform this for the teacher. Sketch what you see in field of light. Use science notebook. Once this is successfully done, go to Bausch & Lomb scope. Look at prepared slide of algae from pond water. Demonstrate your ability to focus for teacher. Sketch what you see in field of light. Use science notebook.

Comments:

Since many of the students have never used the hand microscopes, discuss method use with the entire class. Allow time for individual work. Those that have accomplished this may help those having more difficulty. Some may focus on dirt or a water drop and identify this as the specimen. This is normal in the beginning stages of microscope work. The more the microscope is used, the student should develop better perception. The more powerful scopes allow the student to see what they will be actually looking for. It is well for the teacher to handle both types of scopes for a better understanding. The hand microscopes will not be as good for this study of one-celled organisms. Perception quality is not as good. This is an important pre-activity for the study of life in a pond.

Materials:

Microscopes: Hand microscope - AS&E Microscope
Bausch & Lomb Model R1900

Microscope slides, cover slips, microscope pipettes, and water samples.

ONE-CELLED

Directions to the teacher:

Upon the successful completion of the previous activity, begin the study of one-celled organisms. Show students how to prepare slides of water samples. Place prepared slide of algae (Spirogyra) from a water sample. Use Bausch & Lomb scopes. Again set up four or five and have students work in teams. Provide time for sketching. Emphasize notation of color, size, and shape of individual cells. Discuss with teams. Once this is accomplished have the teams prepare slides and find the same algae from the water samples. Some students may be doing this with the hand microscopes. Repeat this concept the following day using protozoa as specimens

Directions to the students:

Observe the algae under the microscope. Sketch what you see in the field of light in science notebook. Discuss these observations with the teacher. Prepare team slides from water samples. Some students in the team use hand microscopes. Locate the same algae under the scope for the teacher. Try to determine the name of this algae from the keys. Discuss with the teacher.

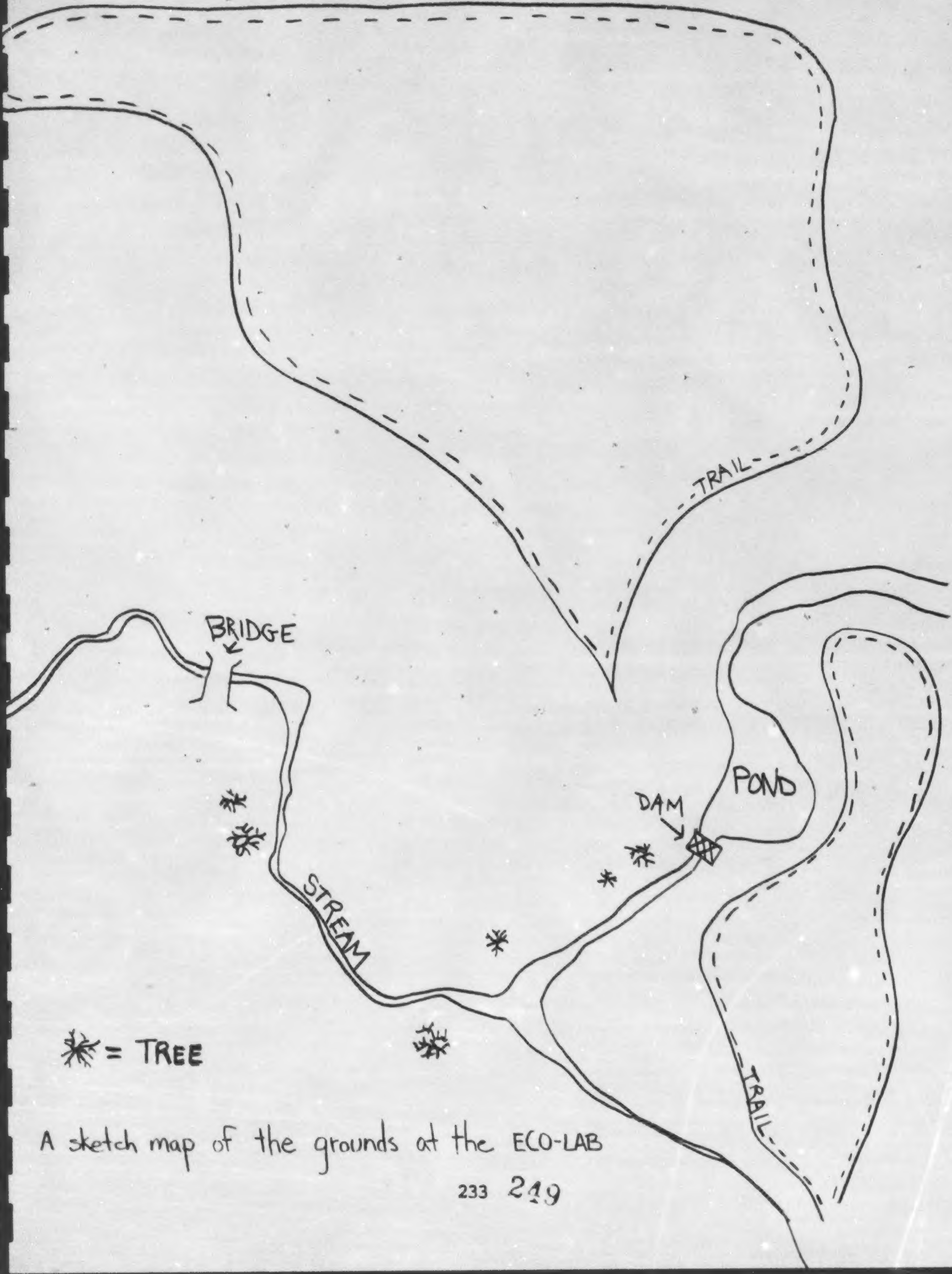
Observe the protozoa under the microscope. Sketch what you see in the field of light in science notebook. Discuss these observations with the teacher. Prepare team slides from water samples. Some students use hand microscopes. Locate the same protozoa under the scope for the teacher. Try to determine the name of this protozoa from the keys.

Comments:

Location of these one-celled organisms is a time activity. The student will normally make more than one slide in order to locate specimen. The teacher should not expect immediate results. The student needs time to locate and then can investigate. The protozoa may be rapid movers. Therefore, it may be necessary to slow them down. The concepts of size, shape, color, locomotion of cells is important in differentiating between algae and protozoa. Use some keys that include the organixms. Often ones that are pictures taken under the microscope and easiest for students to use.

Materials:

Microscopes: Hand Microscope AS&E Miscrscope
Bausch & Lomb R1900
Microscope slides, microscope pipettes, cover slips, and water samples.


TRAIL
BRIDGE
POND
DAM
STREAM
= TREE
TRAIL

A sketch map of the grounds at the ECO-LAB

Intermediate . Submitted by Jacquelyn Cardosi

TO BE OR NOT TO BE
(Seed Germination)

Activity One

Behavioral Objectives:

1. The student will be able to define seed germination.
2. The student will be able to list three items important in scientific labeling.
3. Given a seed during germination, the student will be able to state three parts.
4. Given two methods of seed germination, the student will be able to select the method having optimum conditions for germination. The student will be able to state two of these factors.
5. The student will be able to state how the environment (inside and out) affects seed germination.
6. Given three seeds during germination, the student will be able to rank them in order of greatest and longest growth.
7. The student, given materials for experimentation, will be able to organize them in a logical procedure.
8. The student will be able to sketch changes in seed germination as part of scientific data.
9. The student will be able to manipulate a meter stick to measure growth of root tip.

Directions to the teacher:

Discuss the term germination with the students and relate this to what is happening in the garden with the seeds. Explain the methods of germination that they will use with seeds (without soil). Introduce the ideas of collecting scientific data by sketching observations. Demonstrate how they will set-up a seed study chart in their scientific notebook. Go through the materials they need to organize for the experiment. Assign teams and the particular seed or seeds they will use.

Directions to the students:

Method A

Moisten a paper towel and place seeds (four or five) on paper towel. At this point sketch seeds in seed study chart. Once finished, fold a paper towel so that the seeds are enclosed. Now place paper towel in a plastic bag and seal. Label the plastic bag (masking tape) with this important data: date, seed, team. Place plastic bag away from direct sunlight. Finally, check daily and sketch any changes of seeds in seed study chart.

Method B

Line container (clear plastic or glass) with a moist paper towel. Place a small amount of water at the bottom of the container. Now fill the center space with moist paper toweling. Carefully place the seeds (four or five) around the container. They should be between container surface and liner. Avoid letting seeds fall to the bottom of the container. Leave the container uncovered away from sunlight. Label the container with this important data: date, seed, team. Finally, check daily and sketch any changes of seeds in seed study chart.

Materials:

Seeds: (Same as some in garden), parsnip, lettuce, zucchini, cucumber, radish, Swiss chard, sweet corn, peas, egg plant, beet, okra, asparagus, kohlrabi, gourds and beans.

Containers (clear plastic or glass), plastic bags, rubber bands, paper toweling, black paper, masking tape or labels and water.

Comments:

Recommend that all data be kept in a spiral bound science notebook. Each team could use one type of seed for both methods so a comparison can be made. The seeds were some used in planting a garden. Thus, the student can again make comparisons. Black paper may be used as a liner but is not a good item if the seed is black. It makes observation a little more difficult. It's good to emphasize the difference in moistening and soaking.

Avoid placing label across seeds in labeling technique. It makes observation difficult! Watch for possible growth of fungi.

Activity Two

Directions to the teacher:

Once the seed starts germinating and the root visible, it is time to start this activity. Discuss with the students the parts of the seed visible. What direction does the root go? Let them explain the changes they see occur. As they are able to see the root emerge, explain the marking of the tip. Use the metric system in measuring the root tip growth. The concepts of meter and millimeter may be important to review, depending on background. Measurement of the tip over a period of a week will be made in millimeters.

Directions to the students:

Once root tip is visible, mark with a marking pen. Measure tip daily and record in seed study chart. State daily measurement in millimeters.

SEED STUDY CHART			
Name of Seed	Method A	Method B	Method C
	Date: Sketch Size of Root-mm	Date: Sketch Size of Root-mm	Date: Sketch Size of Root-mm
	Date: Sketch Size of Root-mm	Date: Sketch Size of Root-mm	Date: Sketch Size of Root-mm
	Date: Sketch Size of Root-mm	Date: Sketch Size of Root-mm	Date: Sketch Size of Root-mm

Intermediate   Submitted by Earl Richardson

PLANTING SEEDS AND PLANTS

Behavioral Objectives:

1. The student will be able to define "planting."
2. The student will be able to state at least four different operations needed for planting seeds and plants.
3. The student will be able to recognize and follow directions written on the back of seed packages.
4. The student will be able to state the importance of proper planting as opposed to improper planting.
5. The student will be able to demonstrate the planting of different seeds in the soil at the right depth for proper growth.
6. The student will voluntarily select the seeds and plants he will plant in an area.
7. The student will be able to space seeds and plants in a row properly.
8. The student will be able to work in a cooperative atmosphere while planting seeds with another student.
9. The student will be able to follow a chart of the garden and plant in proper rows.

Directions to the teacher:

The garden plot and rows should be prepared and a chart developed before starting this activity.

Have the class divide into groups of two and let them select the seeds they want to plant. Discuss with each group if they have any questions before they start planting.

Directions to the students:

Choose a partner to work with. Select seeds and plants you want to plant. Carefully read the directions on the back of the seed packages and ask questions if something is not clear. On chart of garden, find the rows where your seeds and plants are to be planted.

Materials:

Vegetable seeds and plants

Comments:

Instead of using groups of two for planting, each student could plant a row himself. I feel that working in groups of two is important in developing social skills with other students.

Intermediate Submitted by Earl Richardson

SAFE CONDUCT IN THE FIELD

Behavioral Objectives:

1. The student will be able to define "safe conduct in the field."
2. The student will be able to state at least three safety practices to be observed while in the field.
3. The student will be able, when presented with a given situation, to pick out two instances of unsafe conduct.
4. The student will be able to state how unsafe conduct can affect others in the class.
5. The student will be able to choose from a list examples of both safe and unsafe field conduct practices.
6. The student will observe and be able to identify types of field conduct.
7. The student will use physical activities in practicing safe conduct.

Directions to the teacher:

Tour the area and familiarize yourself with the potentially unsafe areas of structures.

Discuss with students what safe conduct is, its importance and how to practice it. When giving directions to the students, discuss each area thoroughly for better understanding.

Demonstrate safe procedures in field and keep the student aware of the importance of safe conduct.

Directions to the students:

While in the field, stay in a group behind the teacher and stay on trail unless teacher has given permission to do otherwise. Do not run and/or push; it is not only dangerous to do so, but also destructive to the environment. Can you see how running might destroy some part of the environment?

Cross bridges one at a time, and do not jump needlessly.

When crossing barbed wire, two students, about five to six feet apart, take top wire with hands and put foot on middle wire and spread wire apart. Do not get excited and jerk if caught by a barb. Get help from someone else to avoid falling.

Comments:

When crossing through barbed wire, sticks could be used to spread the wire. A coat or blanket could also be put around barbs to prevent snagging.

Intermediate Submitted by Ann Carver
Jacquelyn Cardosi

THE WAY BIRDS ARE

Behavioral Objectives:

1. The student will be able to define "migration trails."
2. The student will be able to state at least five features that all birds have in common.
3. The student will be able to state at least three principles related to how a bird flies.
4. The student will be able to name three types of feathers found on birds.
5. The student will be able to state three ways in which these feathers differ.
6. The student will be able, when presented with a list of food, to pick out those foods that birds eat.
7. The student will be able to state how the behavior of a bird is beneficial to man.
8. The student will be able to state how birds vary in appearance.
9. The student will be able to state how some birds vary in the types of beaks and feet they have.
10. The student will be able to state how a bird makes its nest.
11. When provided with descriptive accounts of three birds at the Ecology Lab, the student will be able to name the birds.
12. When provided with descriptive accounts of several birds, the student will be able to rank the bird according to its type.
13. When provided with a descriptive chart of bird behavior, the student will be able to fill out the chart through observation.
14. The student will voluntarily read materials regarding birds in the following areas: structure, flyways, their principle in flying and nesting.
15. The student will be able to manipulate feathers and form a design.

WHAT IS A BIRD?

Directions to the teacher:

Use the filmstrip What is a Bird? to introduce the bird unit. From the lesson, the student will become familiar with the following concepts: 1) bird structure, 2) different feathers, 3) principle of flight, 4) flyways, 5) nesting, 6) care of the young, 7) the egg and its development, 8) how birds are beneficial to man.

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Directions to the students:

What is a bird? Today we are going to watch a filmstrip to find out. Please follow along with your book.

Materials:

Filmstrip, projector, and screen.

Instructional Material:

Book and filmstrip: Darby, Gene, What is a Bird? Benefic Press, Chicago.

WHO AM I?

Directions to the teachers:

Have charts prepared for the students before observing the birds. Have some binoculars available for the students. Let the students key out the birds as they observe them.

Directions to the students:

Today we are going to look for different birds. Let's look at our charts to see what we are going to be observing about the bird. Let's find a nest and decide what bird it belongs to. Watch for the bird to come to its nest. What size is it? Is it about the size of a robin? Does it have an unusual shape? What kind of a beak does it have? By observing its beak, does it eat seeds or insects? What color is it? Let's look in our guide book and find what kind of bird it is. Use the information on your chart.

Materials:

Binoculars, chart and pencil

Instruction Material:

Peterson, Roger, A Field Guide to Western Birds

Comments:

A bird specialist is an aide to this activity.

ENVIRONMENTAL EDUCATION AT THE ECO-LAB

BIRD CHART

Size	Shape	Color or Markings	Location or Surroundings	Song	Flight Pattern	Name	Remarks

Intermediate Submitted by Jacquelyn Cardosi

PRE TEST - POST TEST

Objectives:

1. Determine each student's background of knowledge in science.
2. Determine the students', as a group, combined background.
3. The test will enable the teachers to learn weak and strong areas for program planning.

Directions to the teacher:

Administer the test in three parts.
Be consistent in giving directions.

Directions to the students:

Follow the test directions for each part.

Materials:

Tests

Suggestions:

A. Pretest before actual program begins.
B. Possibly tour Eco-Lab and test on one day. This includes all students on a preliminary registration (before session).
C. Registration and testing are set for beginning day.
D. Late-comers cause testing to be prolonged - results are not as reliable.
E. Testing on beginning day can cause enthusiasm of students to falter, even when purpose is explained.
F. If test is given prior to session, this enables the teachers to know initially weak and strong areas.
G. All materials for practical section of the test should be easily accessible.
H. Post test after program.

Environmental Education

Name______________________________ Part I

A. For each of the following questions, pick out the best answer. Circle the letter of the answer you pick for each question.

1. When the sun is in the east, the time of day in Cheyenne is:

   a. Noon
   b. Afternoon
   c. Morning
   d. Evening

2. In the fall of the year, the leaves on a tree will:

   a. Become green
   b. Change color
   c. Be replaced by buds
   d. Be replaced by flowers

3. Climate is:

   a. Average weather for any region
   b. Weather in any one day
   c. Average temperature in a place
   d. How rain affects man

4. An "annual" flower is one which

   a. Blooms only once a year
   b. Has no blossoms
   c. Lives for many years
   d. Lives for only one year

5. A seed that does not grow into a living plant might be:

   a. Rotting
   b. Warm
   c. Asleep
   d. Viable

6. The best reason of those listed below, why seeds may not grow into plant in a garden is:

   a. Weather is warm
   b. Bed rock is rotten
   c. Weather is too dry
   d. Top soil is rich

Name ______________________________ Environmental Education
Part 1, Page 2

7. Which of these things causes a plant to be green?

   a. Chlorophyll
   b. Plant fungus
   c. Hemoglobin
   d. Nicotine

8. A mushroom is a:

   a. Green plant
   b. Poisonous plant
   c. Non-green plant
   d. Tree

9. Which of these colors would absorb the greatest amount of solor energy?

   a. Red
   b. Black
   c. Blue
   d. White

10. An environmental change which is caused by man is:

   a. Weather
   b. Pollution
   c. Bird migration
   d. Predators

11. An environmental change which is caused by animals is:

   a. Overgrazing
   b. Air pollution
   c. Noise pollution
   d. Hibernation

12. A harmful way in which man affects the lives of wild animals is by:

   a. Eating their food
   b. Feeding them
   c. Petting them
   d. Using up their living space

13. Seeds are carried by:

   a. Wind
   b. Animals
   c. Water
   d. Wind, animals and water

Name ______________________ Environmental Education
Part I, Page 3

14. Which of these is a "Micro-climate?"

- a. The weather in a day
- b. A little bit of bad weather
- c. A scientific name of the study of soil
- d. A small area in which plants, animals and weather are affecting each other

15. When the sun has moved from east to west as we see it, the earth has rotated from:

- a. West to east
- b. East to west
- c. North to south
- d. South to north

16. Shrubs will probably grow the fastest in:

- a. Fall
- b. Winter
- c. Spring
- d. Summer

17. In which of these places would you most likely find an evergreen tree growing in the forest?

- a. Florida
- b. Minnesota
- c. Alabama
- d. Mexico

18. Plants which grow in a flower box inside of a house are most likely to disperse their seeds by:

- a. Wind
- b. Dropping them
- c. Exploding
- d. Erosion

19. Which of the following is a perennial flower?

- a. Rose
- b. Petunia
- c. Zinnia
- d. Marigold

Name ______________________ Environmental Education
Part I, Page 4

20. One way in which hummingbirds and robins differ in their behavior is in their:

    a. Methods of reproduction
    b. Wing size
    c. Feeding habits
    d. Color

21. In which one of the following ways would a plant growing in a desert be most different from a plant growing in a swamp?

    a. Color of the flowers
    b. Root structure
    c. One has cells, the other has no cells
    d. Need for sunlight

22. Moss Rose (a spreading plant) could be planted to improve the environment because it would:

    a. Help other flowers to grow
    b. Help prevent soil erosion
    c. Make grass grow
    d. Reduce insects

23. Plants make food by the process called:

    a. Growth
    b. Fruiting
    c. Photosynthesis
    d. Chlorophyll

24. An environmental change which is caused by plants is:

    a. Mulching
    b. Erosion
    c. Oxygen production
    d. Air pollution

25. Man harms plant life most by his causing:

    a. Air pollution
    b. Noise pollution
    c. Water pollution
    d. Trash pollution

26. The reason for control of "Big Game" animals in Wyoming is to:

    a. Balance animal populations with food supply
    b. Control hunting
    c. Prevent attacks by animals upon people
    d. Provide recreation

Name ______________________________

Environmental Education
Part I, Page 5

B. In questions 27-30, pick out one of the things which make up weather lettered A - G from the list on the right. Place the letter of the "weather element" on the space beside the instrument which gives information about that part of the weather.

INSTRUMENTS

27.____________ Thermometer

28.____________ Barometer

29.____________ Psychrometer

30.____________ Weather Vane

WEATHER ELEMENTS

A. Wind direction

B. Air pressure

C. Temperature

D. Wind speed

E. Rainfall

F. Humidity

G. Solar radiation

Environmental Education

Name ____________________________ Part II

C. On this outlined picture of a flower, certain parts of it are lettered

31.________ Which letter is on a reproductive part of the flower?

32.________ Which letter is on a sepal of the flower?

33.________ Which letter is on a petal of the flower?

34.________ Which letter is on the stem of the flower?

35.________ Which letter is on the roots of the flower?

36.________ Which letter is on a leaf of the flower?

D. Place an X on the blank beside the name of each bird which may live in Wyoming all year long.

37._______ Robin

38._______ Hawk

39._______ Bluebird

40._______ Eagle

41._______ Sparrow

E. Tables around the room have various pictures and objects on them. Each table has a letter to identify it. To answer the following questions, go to the table named, inspect what you find there, and answer the questions about it.

Table A. Here are pictures of five birds. Three of these birds are commonly seen in Wyoming in the summer time. Beside 42, 43, and 44 below, write the name of the three birds you would be most likely to see in Wyoming

42.____________________________

43.____________________________

44.____________________________

Name ______________________________ Environmental Education
Part II, Page 2

Table B. There are pictures of four different kinds of clouds on the table, labeled A, B, C. and D. Inspect them, then answer these questions about them.

What kind of weather would we most likely have if you saw clouds of? (Write a word describing it.)

45. Type C____

46. Type D____

47. Type A____

What are the names of these clouds in the pictures? (Write their names.)

48. Type A____________________________________

49. Type B____________________________________

50. Type C____________________________________

51. Type D____________________________________

Table C. There are pictures of three trees. Circle the letter of the picture of a deciduous tree.

52. A.
B.
C.

Table D. These outline pictures of leaves are from trees found in Cheyenne. Write the names of the trees to which each of these leaves belong.

53.____

54.____

55.____

Name ______________________________ Environmental Education
Part II, Page 3

Table E. These are three cones from evergreen trees. Beside numbers 56 and 57 below, write each of two ways that these cones are different from each other.

56. ____

57. ____

Table F. These are pictures of insects commonly seen in Cheyenne. Write the name of each insect in the picture beside its number below.

58. ____

59. ____

60. ____

Table G. Here are five kinds of materials. Pick out the three which are usually found in garden soil. Write the names of each of these three opposite 61,62, and 63 below.

61. ____

62. ____

63. ____

Table H. These three types of soil are different from each other. Inspect them, then write down two ways in which they differ, beside 64 and 65.

64. ____

65. ____

Environmental Education

Name______________________________ Part III

F. Write answers to each of the following questions:

List three ways man could help prevent soil erosion:

66.____

67.____

68.____

Name two ways "topsoil" found in a garden would differ from "topsoil" found in a desert.

69.____

70.____

Name two ways "subsoil" found in a garden would differ from "subsoil" found in the forest.

71.____

72.____

List three ways man manages the environment so that insects and spiders will be helped to live:

73.____

74.____

75.____

Name two ways in which coniferous trees are different from deciduous trees.

76.____

77.____

How are all flowers like each other? (three ways)

78.____

79.____

80.____